PARENT-CHILD THEMAS AND CONCEPT ATTAINMENT IN SCHIZOPHRENIA

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Chapter I

BACKGROUND OF THE PROBLEM

A number of studies (Rodnick and Garmezy, 1954; 1955; 1957) have indicated that the schizophrenic patient is capable of appropriate response in a variety of complex experimental situations. However, his adaptability is tenuous, and subject to impairment under conditions of even minimal censure. Whether the censure is represented by experimenter-induced criticism or by the symbolic portrayal of a censuring mother-son relationship, it may evoke deficits in performance. The extent of this deficit behavior is dependent upon the patient's adequacy of premorbid adjustment, and perhaps, too, upon his early familial environment. The nature of the relationship between premorbid adjustment and parental factors, as it affects the patient's current behavior, is, therefore, of major interest. Conceptual thinking is the specific aspect of behavior under investigation in the present experiment. Three areas of research, relevant to the formulation of the problem, will be summarized in the sections to follow.

The Early Family Environment of Schizophrenic Patients

If the family environment is acknowledged as a critical influence in personality development, disturbances in intra-familial relationships may be expected to have perverse effects upon such development. The severe personality disorganization in schizophrenia has led the disorder to be attributed, at least in part, to distortions in early parent-child relationships. In particular, the mother's influence has been emphasized, especially by proponents of the view that schizophrenia has its inception in the earliest years of life. Fromm-Reichmann's (1948) application of the term, "schizophrenogenic mother," leaves little doubt as to whom she considers to be the chief agent in fomenting the psychosis. Even if the mother is characterized as inadequate (e.g., Szalita-Pemow, 1951) rather than malevolent (e.g., Rosen, 1953), substitution of the former adjective does not mitigate her presumed importance.

Attempts to explore patterns of parent-child relations in more systematic fashion have involved a multiplicity of approaches. These include: 1) review of case history records (Cohen and Lipton, 1950; Kasanin, Knight and Sage, 1934; R. W. Lidz and T. Lidz, 1949; Plank, 1953; Wahl, 1954; Wahl, 1956) which, at times, may be supplemented by "firsthand" data (McKeown, 1950; Reichard and Tillman, 1950); 2) observations made in therapeutic settings (Abrahams and Varon, 1953; Hajdu-Gimes, 1940; R. W. Lidz and T. Lidz, 1952; Peck, Rabinovitch, and Cramer, 1949), or from personal interviews which may be organized around a questionnaire form (Gerard and Siegel, 1950; Tietze, 1949;

Witmer, 1934); and 3) identification of questionnaire items which have empirically differentiated between known groups (Dworin and Wyant, 1957; Freeman and Grayson, 1955; Mainord, 1957; Mark, 1953). While no consistent and definitive characterization of the mother can be abstracted from these diverse approaches, suggestive trends do emerge. Recurrent themas point to the salience of maternal rejection, overprotection, dependence (i. e., a symbiotic relationship), and dominance in the backgrounds of a considerable segment of the schizophrenic population.

Maternal Rejection. The hypothesized rejection of the infant by the mothering figure is seldom encountered at a patently manifest level. Rather, it is more likely to be noted when the patient's point of view is elicited (Hajdu-Gimes, 1940; Kasanin et. al., 1934; Reichard and Tillman, 1950; Tietze, 1949; Witmer, 1934). The discrepancy between parental reports and the patients' sense of rejection is regarded as a quite understandable one by Reichard and Tillman (1950), who differentiate between the overtly rejecting and the covertly rejecting mother. The former is characterized as a cold, sadistically critical woman who has rejected her child from the outset. She insists that he meet excessive demands for her own unfulfilled ambitions, although at the same time, she undermines his self-confidence through incessant nagging and disapproval. Of the authors' 79 mothers, 13% fell into this category and were themselves probably ambulatory schizophrenics. Much more often seen is the covertly rejecting mother, i. e., in 63% of Reichard and Tillman's cases. Her influence

is more subtly malignant, assuming the form of over-protectiveness "of such extreme degree as to merit the appelation 'smother-love.'" This pattern is found in immature egocentric women who excessively baby their children and thus hamper them in their efforts to achieve independence. Presumably these mothers demonstrate reaction-formation against unconscious hostility but the patient is not deceived and "never fails to indicate that he was not loved as a child." Tietze (1949) also ascribes the component of rejection to over-solicitous mothers and surmises its presence "in most other cases."

Maternal Overprotection. Reichard and Tillman are by no means the only investigators to cite the frequent occurrence of overprotection in the schizophrenic's family setting (Alanen, 1955; Ellison, 1949; Freeman and Grayson, 1955; Gerard and Siegel, 1950; Kasanin et al., 1934; Witmer, 1934). Despite some conflicting evidence (McKeown, 1950; Wahl, 1954), there is generally more agreement concerning the presence of overprotection than there is in regard to its explanation. As already noted, the attitude may be attributed to over-compensation for unconscious rejection of the child. Kasanin and his associates (1934), on the other hand, had earlier subscribed to a biological inferiority viewpoint which implies that the patient meets the overprotective parent "more than halfway." According to this position, the child actively solicits extra care and attention and thereby initiates a vicious cycle since the receiving of this care impedes his emancipation from his parents. Gerard and

Siegel (1950), however, reject the "extra-hazard" hypothesis and offer the counter-proposal that the mothers tend to project their own inferiority feelings onto their children. It is presumably the mothers' perception of the world at large as threatening and dangerous that underlies their overprotective attitudes.

Maternal Dependence. That the mother may have deep-seated feelings of inadequacy is consonant with the emerging realization of a heightened interdependent relationship between the mother and her pre-schizophrenic child (Abrahams and Varon, 1953; R. W. Lidz and T. Lidz, 1952; Limentani, 1956; Prout and White, 1950; Reichard and Tillman, 1950). In this so-called symbiotic relationship, the mother is presumed to relate to her offspring largely as an alter ego. It is as though she has so little sense of "being" in her own right that her existence is contingent upon the child's remaining dependent upon her in order to assuage her own sense of inferiority. The child senses the covert threats of rejection should he seek independence, but at the same time, requires a safe maternal figure for security. His consequent strivings to maintain the mother "as a benevolent figure when she is basically malevolent toward the patient as a _separate individual_" may invoke "profound distortions of reality" (R. W. Lidz and T. Lidz, 1952).

Maternal Dominance. Concomitant with the mother's attempts to keep the child in a subordinate role may be demands for strict conformity with parental expectations. Excessively domineering, restrictive, or

moralistic attitudes of child-rearing are prevalent in the mothers of schizophrenics (Alanen, 1955; Dworin and Wyant, 1957; Mark, 1953; McKeown, 1950). These women are especially likely to react toward manifestations of sexual behavior in their children with punitive measures or other suppressive techniques (Freeman and Grayson, 1955; Harris, 1955; Mark, 1953; Tietze, 1949). Although the actual estimates vary, the schizophrenic's mother is often found to be the dominant parental figure in the home (Cohen and Lipton, 1950; Gerard and Siegel, 1950; Kohn and Clausen, 1956; Reichard and Tillman, 1950). Freeman and Grayson (1955), who failed to differentiate between mothers of schizophrenic and those of normal sons on a Dominance subscale, hypothesize that attitudes of subtle domination may be more characteristic of the former group. This view was given particular emphasis by Tietze (1949), who found that in relation to the psychiatrist, all 25 of the mothers under study were comfortable only so long as they could control the situation. Some of these women tried to dominate through over-demanding behavior but most of them were very subtle in their manipulation of the situation. "They felt righteous about their own performance, expected perfection from the other person, yet firmly believed that they 'expected nothing in return.'" Other investigators have also called attention to this attitude of self-sacrificing martyrdom on the part of patients' mothers (Dworin and Wyant, 1957; Freeman and Grayson, 1955; Mainord, 1957). Tietze concluded that this type of mother may have especially perversive effects

upon her child. Whereas overt domination may provoke frank rebellion, "children exposed to this form of subtle domination under the disguise of maternal love and sacrifice are deprived of any outlet for their aggressive impulses."

Role of the Father

The father has typically been the neglected member of the family triad. Only relatively recently has his impact upon the child's personality development become acknowledged, and indeed, R. W. Lidz and T. Lidz (1949) contend that "the paternal influences are noxious as frequently as are the maternal."

Paternal overprotection has received some mention in the literature (Gerard and Siegel, 1950; Kasanin et al., 1934; Witmer, 1934). More commonly noted is a diminished relationship between the father and his schizophrenic child, with minimal contact and passive rejection or disinterest on the father's part (Gerard and Siegel, 1950; Kohn and Clausen, 1956; McKeown and Chyatte, 1954; Wahl, 1954). Those studies which give brief consideration to the father usually represent him as weak, passive, quiet, inadequate, immature, or indifferent. Even so, he is not absolved from a contributory role in his son's psychosis since, in the presence of a dominant parent who exercises a more traumatic influence, inability of the weaker parent to provide support may be further crippling to the child (Arieti, 1955; Bateson, Jackson, Haley, and Weakland, 1956; T. Lidz, Cornelison, Terry and Fleck, 1957; Reichard and Tillman, 1950).

In addition to his indirect participation in his offspring's illness, the father has also been credited with a more active role (Arieti, 1955; Ellison and Hamilton, 1949; T. Lidz, Parker, and Cornelison, 1956; Reichard and Tillman, 1950). Reichard and Tillman, for example, isolate the father as the specific schizophrenogenic agent in 12 (or 15%) of their cases, describing him as domineering, sadistic, overtly rejecting, and resentful of his wife's attention to their children. Beneath this facade, however, the father is thought to be weak and ineffectual and dependent upon his ill-treated spouse for pathologically craved adulation.

In an initial compilation of material based upon intensive study of 14 families, T. Lidz et al. (1957) have classified the fathers of schizophrenic patients into five tentative, overlapping groups: 1) fathers (of some female patients) who are in severe conflict with their wives with whom they compete for the children's favor; 2) self-centered men who are hostile toward their sons whom they regard as rivals for the wife's attention. These men are apt to belittle their sons' achievements and to impede their wives' efforts to be mothering; 3) men with exalted, and perhaps even grandiose self-concepts who remain aloof from their offspring and convey the impression that no one can measure up to themselves; 4) fathers who are such total failures in life that they have become virtual non-entities in their own homes; and 5) submissive, undemanding men who accept the wife's authoritarian role and acquiesce in her deviant child-rearing practices.

In summary, there appears to be an emerging consensus that in an overwhelming majority of cases, fathers of schizophrenic patients have failed to fulfill their paternal roles adequately, and have served as poor identification models for their sons. Furthermore the fathers are likely to exhibit one of two strikingly divergent patterns. More commonly encountered is the extremely passive, unassuming, ineffectual man coupled with a nagging, aggressive, domineering wife. Less frequently seen, but still conspicuous, is the converse--the tyrannical, hostile, abusive household "dictator" married to a passive, compliant, long-suffering spouse.

Correlates of Good and Poor Premorbid Adjustment

A relationship between premorbid adjustment and performance deficits under censure was alluded to earlier. Instrumental in highlighting this relationship has been the application of the Phillips Prognostic Rating Scale (Phillips, 1953) to case history data. Originally devised to predict the outcome of treatment, the Prognostic Rating Scale consists of three major sections: Premorbid History; Possible Precipitating Factors; and Signs of the Disorder. Only the first of these sections, which Phillips cited as having the highest predictive validity, has been used in studies conducted at Duke University (see Appendix A).

The Phillips Scale of Premorbid Adjustment. Five ordinal subscales constitute the Scale of Premorbid Adjustment which centers upon social and sexual adjustments in the patient's recent and remote past,

prior to hospitalization. Each subscale assigns weights, which may range from 0 to 6, to certain behavioral features that are likely to be included in case history records. Higher scores are in the unfavorable direction. For example, on one subscale, Recent Sexual Adjustment, a patient who has maintained a "stable heterosexual relation and marriage" would earn a rating of 0, whereas a patient who has shown "no sexual interest in either men or women" would score at the opposite extreme of 6. The overall premorbid rating is arrived at through simple addition of the five subscale scores; the total possible range is from 2 to 30. Typically, the cut-off point of 15 has been established to dichotomize schizophrenic patients into two groups, designated as good premorbid (15 and below) and poor premorbid (16 and above). All observations have been restricted to male Ss since the scale, which is heavily weighted on the variable of marriage, has thus far failed to demonstrate comparable predictive validity for female schizophrenics. Rodnick and Garmezy (1957) suggest that this disparity in the scale's effectiveness may be attributed to the differential cultural roles assigned to marriage for men and women.

Once it became apparent that the use of the scale might dramatically reduce the variability typical of schizophrenics' performance in experimental situations, premorbid adjustment was incorporated as a control or independent variable in a series of investigations. A review of the ways in which the good and poor premorbid groups have subsequently been found to differ is reported elsewhere (Rodnick and Garmezy, 1957).

Briefly, these differences may be said to fall within three interrelated areas:

1) Performance under stress-- Good and poor premorbid schizophrenic patients are differentially reactive to the introduction of censure, both experimenter-induced and symbolically represented. The poor group tends to perform less adequately under stress conditions than the good group, and frequently differs significantly from normal control Ss. The good premorbid group commonly occupies an intermediate (and often, non-significant) position between the normal control and poor premorbid groups.

2) Prognosis-- The Phillips Scale was originated in order to provide a quantitative index for prognostic potential, and its validity appears to be well-founded. Generally good premorbid schizophrenics are more likely to be discharged, to have a shorter hospitalization period, and following discharge, to remain out of the hospital for a longer duration of time than are poor premorbid patients.

3) Familial background-- Further associated with the two groups of schizophrenic patients appear to be differences in earlier intrafamilial relationships. Research trends suggest that whereas for the poor premorbid schizophrenic patient, the mother may have been the more dominant and presumably, traumatogenic figure during childhood, for the good premorbid patient, it is more likely to have been the father.

Studies which indicate a systematic relationship between sex of the dominant parent and the premorbid adjustment of the schizophrenic son have been summarized by Farina (1958). Generally, the poor premorbid patients perceive their mothers as having been dominating and restrictive, in conjunction with more easy-going but rather ineffectual fathers. Good premorbid schizophrenics, on the other hand, are more prone to describe their fathers as the harsh dictatorial figures in the homes, coupled with more warm and accepting mothers. Parallels between these parental trait clusters and those offered in an earlier section are unmistakeable. Moreover, direct observation of parental interaction lends further credence to this differential patterning of familial relationships. In a recently completed investigation, Farina (1958) required the parents of good and poor premorbid male schizophrenics (and of non-psychiatric patients) to solve disciplinary problems in child rearing, as presented in 12 hypothetical situations. Initially the mothers and fathers were interviewed separately and later, jointly. Measures of dominance and conflict were secured during the parents' attempts to arrive at mutually acceptable solutions. On the basis of their behavior, Farina was able to abstract certain characteristic patterns of relationship for his various subject groups. In good premorbid families, the father was apt to be strongly ascendant, and the mother, weak and submissive, with a minimal degree of overt discord. In poor premorbid families, by contrast, the mother was markedly dominant, with some tendency toward submission on the father's part, but with evidence, too,

of a considerable degree of conflict. On the whole, it would appear that direct contact with the parents tends to confirm the patients' subjective interpretations.

Conditions Relevant to Deficits in Conceptual Behavior

So frequently does impaired conceptual thinking occur in schizophrenia that its presence has often been regarded as a pathognomic feature of the disorder. There is, however, marked variability in the patients' performance, and findings of impaired conceptualization are by no means universal. More recent investigators, therefore, have begun to explore systematically the role that particular variables in the experimental situation may play in the education of conceptual deficits. Conditions which are relevant to such deficits may be associated with the task, with the subject, or with an interaction between task and subject factors.

Task-Relevant Conditions

One of the first systematic attempts to investigate effects of censure upon conceptual performance in schizophrenics was undertaken by Webb (1952; 1955). He gave to a group of 28 hospitalized male schizophrenic patients two alternate, comparable forms of a similarities test. Before presenting the second form, Webb mildly admonished the subjects, as follows:

> Offhand Mr. Doe, it looks like you did worse than would have been expected of you. If you'll wait a few moments, I'll score your answers and we'll see. (E then spent two minutes, presumably scoring). Well, I've scored your answers, now, Mr. Doe and it turned out that you did worse than I thought at first. I have another test here; lets see how you do on it.

To a control group of 24 schizophrenic patients (matched with the experimental group on age, education, vocabulary, and duration and subtype of illness), Webb administered the same tests, but this time interpolated a brief, irrelevant task between the two forms. These control Ss improved in scores from the pre- to the post-test form whereas the experimental group not only failed to show a comparable improvement, but actually declined during the latter part of the post-test session. Mean differences between the groups were significant beyond the .001 level. Webb thus demonstrated that even relatively mild verbal disparagement might lead to a decrement in abstract thinking.

Rotman (1954) subsequently incorporated the same method of verbal criticism into a study comparing 25 closed ward schizophrenic patients with 25 psychiatric aides, equated for age, education, and intelligence. He predicted that the patients would show greater deficits than the control Ss on both a conceptual task (Van Wagenin's Graded Analogies) and a concrete motor task (Minnesota Rate of Manipulation). He further hypothesized that relative to the normal Ss, the patients would exhibit a greater deficit on the abstract conceptual task than on the concrete motor test. Neither expectation was confirmed, although the second prediction was substantiated after data from the eight paranoid

schizophrenics (comprising one-third of the patient population) were ruled out of consideration.

Another attempt to assess the effects of different conditions of reinforcement upon the conceptual learning of hospitalized schizophrenic patients was undertaken by Maginley (1956). His materials consisted of a randomly arranged series of 54 wooden blocks of 3 different colors, 3 different shapes, and 2 different heights. On the first part of the test the S was required to learn that a concept "X" referred to tall blocks; subsequently, short blocks were reinforced as correct. Altogether, Maginley used 8 groups of 10 Ss each, equated for mean age, education, and vocabulary score. Schizophrenic patients comprised four of the groups and non-psychiatric medical patients,the other half. Each experimental and each control group was tested under one of four conditions: 1) reinforcement of correct response only, by illumination of a white bulb or 2) by a verbal, "Good"; 3) reinforcement for both correct and incorrect responses via a white vs. a blue bulb (labelled "threat of failure") or 4) via the utterances, "Good" vs. "No Good" (labelled "threat of disapproval"). Maginley anticipated that in comparison with the normal Ss, the schizophrenics would perform at a generally lower level and would manifest greater deficits under both threat conditions, with "threat of disapproval" being the more potent of the two. His predictions were not supported. In overall comparisons of performance level, there were consistent but insignificant differences in favor of the control Ss. Under threat conditions all groups showed impairment, with neither type of

threat being more deleterious than the other.

The foregoing studies share in common the application of more or less explicit threats of criticism, which are independent of the test materials themselves. Threat-induced stress, however, may also be implicitly introduced through the symbolic representation of anxiety-arousing situations, and as such, is incorporated as an inherent feature of the stimulus materials. This latter approach, frequently using so-called "emotionally laden" contents, is the one more commonly adopted in conceptual research with schizophrenics. Whiteman (1954), for example, sought to demonstrate that such patients, relative to normal Ss, would show greater decrements on tests of social concepts than on tests of formal concepts. He defined formal concepts as those involving the abstraction of features which are common to a variety of non-interpersonal situations, and can be described in physical, quantitative, psychophysical, or relational terms, e.g., color or "middleness." To assess performance on formal concepts, Whiteman used a 32-item verbal analogies test, plus an 11-item picture reasoning scale which required the S to put sets of 5 cards each into proper sequence according to a logical-relational concept (e.g., size of box). On the other hand, social concepts were presumed to involve abstraction of features which are common to interpersonal situations and are describable in terms of interpersonal functional relationships, e.g., "cooperation." Effectiveness on this type of concept was estimated by a specially devised picture test consisting of 21 sets of 4 to 6 cards each. In each set, three of the cards portrayed some instance of

a particular social concept, e.g., rescuing someone in distress, and the S's task was to select the inappropriate instances and then explain the commonality underlying the remaining cards. These formal and social concept tests were administered to 31 relatively undeteriorated schizophrenic patients and to a control group drawn from factories and business establishments, and equated with the patients for age, education, and vocabulary. Results were in accordance with Whiteman's hypothesis. While all tests discriminated between the two groups in favor of the control Ss, the disparity was greater on the social concept test, and remained significant even after differences on the formal concept test had been partialled out.

Wexler (1955) also undertook to test the hypothesis that conceptual deficits shown by schizophrenic patients, relative to normal Ss, are greater on emotionally toned than on neutrally toned tasks. His subject population consisted of 30 recently hospitalized paranoid schizophrenics and 30 normal Ss, matched on a group basis for age, education, occupation and intelligence. All Ss were individually tested on four conceptual tasks, two containing neutrally toned content, and two with emotionally toned content, i.e., related to sex and aggression. The stimulus materials represented a modification of Zaslow's (1950) technique. Four independent sets of 13 pictures each were used. Each set varied progressively in degree from one end-point of a continuum to the other, as follows: 1) from a triangle to a circle; 2) from a series of cards graded as true red to those considered true orange; 3) from male to female figures; and 4) from the

portrayal of a friendly situation to one that was obviously hostile. On tasks requiring the arrangement of stimuli into a logical continuum, the two groups of Ss did not differ significantly in mean number of errors on the neutral sets but did differ at the .01 level on the emotional sets, in the predicted direction. Similarly, on tasks of conceptual judgment, i.e., deciding the class to which an individual picture belonged, the patients, relative to the control Ss, demonstrated more intolerance for ambiguity on emotionally toned items than on neutrally toned ones.

The same hypothesis of differential deficits between normal and schizophrenic Ss under conditions of stress, was tested by Tomblen (1957), with the application of quite different techniques. Seventeen recently hospitalized male paranoid schizophrenics and 17 normal Ss, matched with the patients on age, education, and vocabulary, were given two forms of an object sorting test. One of these forms was the Goldstein Object-Sorting Test which was regarded as relatively neutral. The other was a parallel anxiety form which included such items as guns, razors, nude dolls, condoms, under-garments, boxing gloves, etc. An equal number of additional Ss received neutral and anxiety-arousing forms of a picture-sorting test, which had been rated for anxiety-evoking potential by a panel of psychologists. On all tests, an active sorting phase always preceded a passive sorting phase, and the neutral form was always administered prior to the emotional form. It was found that under all conditions the schizophrenic patients were conceptually impaired, as contrasted with the normal control groups. However, even after an adjustment had been

made for the influence of neutral scores on the anxiety scores, differences between the groups were significant at the .01 level.

Further confirmatory support for an hypothesis of differential deficits was evidenced in an investigation conducted by Davis and Harrington (1957). They administered two sets of 32 pictures each to 50 state hospital schizophrenics and to 50 high school students, equated for IQ or grade achievement. In one class of pictures, the human array, instances were equally subdivided according to sex of the person; whether or not the person held a book; whether or not he (or she) wore glasses; whether or not the person wore a tie (or if female, a scarf); and whether or not the person wore a hat, if male, or a coat, if female. In the other class of pictures, the non-human stimuli, there might be letters (big or little) or non-letters (numbers or figures), printed in red or blue, at the top or bottom of the card, and either encircled or boxed. With a maximum number of five bits of information, any particular picture in a set could be located. Subjects were given one bit of information at a time, and credited with the number of bits, from zero to five, that they were able to use effectively in selecting pictures. When the groups were subsequently matched according to performance on the non-human set, the schizophrenic patients were inferior to the control Ss on the human array, at an .01 level of confidence.

Critical Overview of Task-Relevant Conditions. On the whole, it appears that schizophrenic patients show greater deficits in conceptual behavior, relative to normal control Ss, on stimulus materials with

presumed anxiety-arousing contents. Whether or not the differential deficits are due to the content per se, however, obviously depends upon the comparability of the parallel conceptual tasks. It is especially advisable that the same aspects of conceptualization be involved in both tasks; this implies that the requirements for solution should be as nearly identical as feasible. Whiteman's (1954) tests of formal and social concepts did not unqualifiedly meet this criterion. His formal tests required the arrangement of a group of pictures into a logical sequence, whereas his social tests required recognition of the inappropriate instances among a group of items sharing some commonality. Wexler's (1955) adaptation of the Zaslow (1950) technique overcame this particular objection, but on the other hand, did not control for comparable levels of difficulty and complexity between neutral and emotional tasks. At least in terms of face validity, it would seem that to differentiate between a circle and a triangle may be neither as complex nor as difficult a task as to discriminate between a hostile vs. a friendly interpersonal situation. It is possible, therefore, that the patients' enhanced deficits on the latter task are attributable not merely to the contents, but perhaps, too, to the stress induced by a more demanding test requirement.

In the few investigations which have introduced explicit threats of disapproval, differential deficits between schizophrenic and normal Ss have not unequivocally shown up in the findings. It may be that censure which is generalized or global in application is one factor accounting for this lack of consistency. Rotman (1954), for example, interpolated his

verbal disparagement between two tasks. What may be significant in eliciting differential deficits between two groups of Ss under stress, however, is the specificity of criticism to the S's individual responses. Conceivably, response-specific censure might provide informational cues which could lead to improvement in one group, while in another group, it might evoke emotionality of sufficient degree to disrupt effective conceptual behavior. Maginley (1956) did apply response-specific censure but nevertheless failed to confirm the hypothesis that performance deficits under threat conditions are comparatively greater for schizophrenic than for normal Ss. This is a not too surprising outcome since another factor probably influencing the results is the vulnerability of the S to experimenter-induced censure. It cannot be assumed that schizophrenic patients, as a whole, are all equally vulnerable to such censure. On the contrary, it has been noted previously that poor premorbid schizophrenic patients are more sensitive to the introduction of criticism than are good premorbid schizophrenics, on non-conceptual tasks, at any rate. Maginley, then, did not take into account potentially important subject variables which may have affected results. Since conditions relevant to conceptual deficits are associated not only with task variables (which have been discussed above), but also with subject-related variables, the latter will be considered in the section immediately to follow.

Subject-Relevant Conditions

Within the schizophrenic population, favorable prognosis is the factor

that has most commonly been associated with adequacy of performance on conceptual tasks. For example, Adler (1942) reported a positive relationship between the number of functionally similar choices made on a picture matching test by schizophrenic patients, and these patients' prognostic potential. Patients who were expected to be discharged within the month, on the basis of psychiatric evaluation, attained a higher mean score than those whose discharge was expected within the year. The latter Ss, in turn, were more adequate in performance than patients rated as probably incurable. Only a few years later, Benjamin (1946) also suggested a relationship between thought disturbance, as revealed on the Rorschach, and the patient's tendency to "follow the classical dementia praecox course." The absence of thought disturbance, on the other hand, was presumed to be associated with an atypical course, marked by a higher incidence of recovery.

Because of the variability shown by schizophrenics on his conceptual techniques, Hall (1951) has recommended that the patients' previous life histories be carefully scrutinized for signs of the illness. His suggestion is that a sudden, as opposed to an insidious onset, might be related to intact conceptual functioning. Meadow and his associates (Meadow and Funkenstein, 1952; Meadow, Greenblatt, Funkenstein and Solomon, 1953) have maintained that in schizophrenic patients with a poor prognosis, there is a high correlation between defects in abstraction (based upon proverb interpretation and word similarities tests), personality disorganization, and abnormal autonomic reactivity (in terms of systolic blood pressure reactions to mecholyl). By contrast, patients who respond favorably to treatment exhibit

a well preserved capacity for abstraction, a more intact personality organization, and more normal autonomic reactivity patterns.

Flavell (1956) administered a word-choice test to 24 chronic schizophrenic men and to 20 control Ss (psychiatric aides), equated for education and vocabulary. He found that normal Ss selected choice words bearing an abstract essential meaning relationship to stimulus words significantly more often than did the patients. The group distributions, however, showed considerable overlap. Within the patient group, success on the test was positively correlated with adequacy of social relationships. Social adequacy was based upon the ward nurses' ratings of the patients' behavior with respect to four aspects of social interaction: sociability, emotionality, coherence, and awareness.

In another correlation type investigation, Becker (1955; 1956) tested the hypothesis that "schizophrenic patients who more nearly approximate the 'process' syndrome as judged from their case histories will show more disturbed thinking processes than those who more closely approximate the 'reactive' syndrome." The process syndrome, indicative of poor prognosis, includes such features as withdrawn prepsychotic personality, insidious onset of psychosis, absence of readily identifiable precipitating events, clinical presence of dull or inappropriate affect, and clear sensorium. The converse of this cluster constitutes the reactive syndrome, which is presumed to reflect good prognosis. In his study, Becker included the Benjamin Proverbs Test (1946), for which he devised a reliable scoring system based upon six levels of response, ranging from the absurd

and literal to various degrees of correctly generalized interpretations. This test (along with others) was administered to 24 male and 27 female recently hospitalized schizophrenic patients. To assess resemblance to the process or reactive syndromes, Becker applied the Wittman-Elgin Prognostic Scale to case history materials. In accordance with his prediction, he found a negative correlation for his male _Ss_ between the Elgin Scale (high scores represent the poorer end) and a proverb measure, controlled for effects of vocabulary level. This correlation was significant beyond the .001 level.

In summary, there have been suggestions of a positive correlation between adequacy of conceptual functioning in schizophrenia and such interrelated factors as imminent date of discharge, acute onset and atypical course of the illness, favorable response to treatment, effective social interaction on the ward, and the _S_'s approximation to a reactive syndrome. Each of these factors, in turn, has been associated with favorable prognosis.

Interaction Between Subject-Relevant and Task-Relevant Conditions. A relationship between severity of illness in schizophrenia and the patient's responsivity to distracters on a conceptual task has been indicated by Chapman (1956). In his investigation, 25 normal _Ss_ (mostly Naval Corps school cadets) and 40 chronic schizophrenic patients, equated for education and intelligence, were given a cleverly devised picture-matching test. The _Ss_ were presented with three standard stimulus cards, each bearing four figures. They were instructed to match figures on response cards to the

lower right hand figure of the stimulus cards on either the basis of an identity or a conceptual commonality. Each response card always contained a figure which enabled it to be paired correctly with one of the standard stimulus cards, in accordance with the instructions. However, it might also contain up to three additional commonalities ("distracters") which could be matched with pictures in an incorrect location on other stimulus cards. At the zero distracter level, the schizophrenic patients differed only slightly and non-significantly from the control group. As the number of distracter figures were increased, so too, did the number of errors made by the patients increase, whereas those of the control Ss remained constant. The patients' performance, however, was characterized by extreme variability which Chapman sought to reduce by dividing the patients into full privileged vs. locked ward cases. Susceptibility to distracters was more likely to occur in patients in the latter group. It should be remembered that Chapman's focus was not on the effects of anxiety or stress upon conceptual behavior in schizophrenia. Rather, he was interested in providing more or less neutral opportunities for distraction, which the S had to ignore in order to solve the task.

Possibly the only investigator who explicitly set out to explore interaction effects between a task-relevant and a subject-relevant condition was Schupper (1955). His intent was to assess cognitive functioning, including concept formation, in two groups of schizophrenic patients, under conditions of acceptance and rejection. Schupper's underlying assumption was that a specific condition of interpersonal threat would increase the schizophrenic

patient's social disarticulation and be reflected in cognitive decrements. He reasoned that the extent to which this defense maneuver would be invoked was a function of the length of time it had been predominant in the Ss past life. Accordingly, 40 schizophrenic patients, all recent admissions to the hospital, were dichotomized on the basis of "nosological age," defined as the duration of time between the current testing date and the date of the patient's very first hospitalization for psychiatric illness. In the younger nosological group, no patient had been initially hospitalized more than 2.3 years previously, and most were first admissions; in the older group, all had been originally institutionalized at least 4.9 years earlier. The two nosological groups were equated on chronological age. All Ss were given parallel forms of a similarities and a proverbs test (plus two other tests) under two contrasting experimental conditions. Under the acceptance condition, the Examiner made every effort to appear warm, sympathetic, and encouraging, whereas under rejection, the same Examiner acted in a cold, threatening, and disinterested manner. Schupper's expectation, that the older nosological group would be more adversely affected by threats of rejection relative to the younger group, was not borne out. On the concept formation tasks, both nosological groups showed a comparable (albeit significant) decrement in performance under rejection as compared with acceptance.

Critical Overview of Subject-Relevant Conditions. Tomblen (1957) was one of the few investigators to restrict his schizophrenic sample to drug-free cases. For the most part, investigators have made no mention

of ataractic agents, which may be taken as presumptive evidence of their failure to control for this factor. Since an essential property of ataractic medication is its anxiety-reducing potential, however, where a researcher is interested in determining effects of anxiety-evoking conditions upon conceptual behavior, he cannot justifiably ignore the possible effects of tranquilizing medication.

It is essential, too, to take cognizance of the subject variables most often found to correlate with conceptual functioning, i.e., age, education, and intelligence. On the basis of conceptual tests administered to 37 chronic male schizophrenics, matched by pairs with non-psychiatric patients for age, education, and vocabulary, McGoughran and Moran (1956) concluded:

> Differences in conceptualization in the object-sorting task were clearly more closely associated with estimated test intelligence and education than with the presence or absence of schizophrenia. This strongly suggests that these control factors cannot safely be disregarded in experimentation in the conceptualization area.

The positive relation between intelligence and conceptual ability would seem to be so obvious as to make McGoughran and Moran's admonition quite unnecessary. Yet, surprisingly, several experimenters have quite casually ignored the importance of intellectual level. In at least two instances (Adler, 1942; Kugelmass and Foundeur, 1955), college students served as controls for schizophrenic patients, with no indication of any attempt to equate the groups for intelligence.

It has been noted that several factors associated with favorable prognosis appear, too, to correlate with adequacy of performance on conceptual tasks. Ideally, it would be preferable to control for this variable within the schizophrenic group, independently of effects of institutionalization or chronicity of the illness. Some index with predictive validity for probable recovery would best subserve this function. Schupper's (1955) dichotomy on the basis of nosological age unfortunately has few known correlates. Schupper implied that the younger nosological group was more intact than the older. It may be, however, that the younger nosological patients, most of whom were first admissions, would be less apt to show improvement than the older nosological patients (readmissions) who, in the past, have already demonstrated favorable response to treatment. Becker's (1955; 1956) application of the Elgin Scale was more propitious; the scale, however, has certain limitations. It usually requires a very detailed case history which is seldom available, at least in state hospitals, and it is apt to involve highly subjective evaluations on the part of the rater. Not subject to these limitations is the Phillips Scale of Premorbid Adjustment. Although it has not heretofore been applied in the area of conceptual research, the Phillips Scale may be expected to reduce the variability shown by schizophrenic patients, as a whole, especially under threat conditions.

Chapter II

STATEMENT OF THE PROBLEM

As indicated in the previous chapter, the role of the mother as a possible schizophrenogenic agent has been emphasized in clinical studies. On an experimental level, there is evidence that both experimenter-induced censure and stimulus materials portraying an adverse mother-son relationship may induce deficit performance in schizophrenics. The extent of this deficit behavior is relatively greater for poor premorbid schizophrenic patients than for good premorbid schizophrenics. It is possible, however, that these two groups of schizophrenic patients may be differentially sensitive to the sex of the rejecting or criticizing parent. For poor premorbid male schizophrenics, the mother has been identified as the more dominant and hence, presumably, more traumatogenic agent during childhood. For good premorbid schizophrenic patients, on the other hand, there is tentative evidence that the father may have been the

more dominant parent. These presumed differences between poor and good premorbid schizophrenics in the actual patterning of parent-child role relationships raise the question of the relative degree of cue relevance for deficit of censuring mother-son and father-son stimulus materials. The present experiment was devised in order to assess the comparative effects of such thematic materials upon the conceptual performance of the two groups of schizophrenic patients.

An index of conceptual performance was selected as the dependent variable because of the centrality of disturbed thought processes to the schizophrenic disorder. Studies reviewed earlier have indicated that deficits in conceptual thinking may be enhanced by stimuli representing sex, aggression, or indeed, any interpersonal relationship or human content, per se. These stimuli have in common some aspect of social interaction--an area of functioning believed to be especially stressful for the schizophrenic patient. It might be supposed that a conceptual task would also be sensitive to effects of parent-child themas which bear an analogical relationship to presumed significant sources of stress in the patient's early life history. Specifically, it might be expected that on a conceptual task, the performance of poor premorbid schizophrenic patients is relatively more impaired by stimuli portraying a censuring mother-son relationship, whereas that of good premorbid schizophrenics is more adversely affected by comparable father-son pictures. By contrast, on positively toned parent-child thematic materials, as well as on

neutral stimuli, the performance level of schizophrenic patients might be expected to be relatively closer to that of a normal control group.

To evaluate the influence of parent-child themas on conceptual performance requires an experimental technique which allows variations in content to be introduced from one set of pictures to another, while the apparent difficulty and complexity of the task is held constant. Furthermore, the method should be feasible for use with disturbed schizophrenic patients, and preferably, applicable to a wide range of intelligence levels. Pilot studies indicated that an adaptation of the Bruner concept-attainment technique (Bruner, Goodnow, and Austin, 1956) fulfilled these requirements, and it therefore served as the method of choice in the present experiment. This method permitted a comparison of the effects on conceptual thinking of stimulus materials representing both positively toned (i. e., nurturant) and negatively toned (i. e., censuring) mother-son and father-son relationships.

Since good and poor premorbid schizophrenic patients have not previously been compared on a task involving some aspect of conceptual behavior, such a comparison represents a secondary objective of the investigation. On the basis of the relative ordering among poor and good premorbid patients and normal control Ss on other, non-conceptual experimental tasks, it might be expected that in overall performance on the concept-attainment task, the good premorbid group would occupy an intermediate position. This ordering would be especially likely to occur

if, as may be the case, strong overgeneralizing response tendencies, incompatible with effective solution, are more readily mobilized in poor premorbid patients by the mere presence of censure-associated stimuli. On the other hand, the inclusion of negatively toned father stimuli, with their presumed cue relevance for good premorbid schizophrenic patients, may attenuate overall differences between the two schizophrenic groups.

It should be emphasized that this investigation is essentially an exploratory one. Its primary purpose is to secure evidence of the differential responsivity of good and poor premorbid schizophrenics to cues concerning the patterning of parent-child relationships in early periods of personality development.

Chapter III

PROCEDURE

Subjects

A total of 48 schizophrenic patients and 16 normal control Ss constituted the research population in the current study. All participants were white males, between the ages of 18 and 45, literate, of at least dull normal intelligence, able to comprehend instructions, and willing to cooperate in the test procedures. In addition, the patients were selected according to the following criteria:

1) staff diagnosis of schizophrenia with no known or suspected organic brain pathology;

2) first known hospitalization for psychosis within a two-year period prior to participation in the study; and

3) no electro-shock therapy administered for at least the past four months.

These criteria were successfully applied with but a few exceptions. Two patients were included whose initial hospitalization somewhat exceeded the two-year period, as noted in Appendix B, and two subjects were currently under insulin treatment, while two others had only recently completed similar courses of therapy.

On the basis of the Phillips Scale of Premorbid Adjustment (described in the introductory chapter and presented in Appendix A), the patients were divided into two levels of social-sexual adequacy. Sixteen schizophrenics with ratings of 13 or below on the scale were classified as the good premorbid group (GPM), and 16 others with scores of 17 or higher, as the poor premorbid group (PPM). None of these 32 had received tranquilizing medication for at least four days prior to the test. In order to determine the effects of such medication, an additional group of poor premorbid schizophrenics under ataractic drug therapy (D-PPM) was included. Half of the Ss in this drug group were on "thorazine" and the remainder, on a variety of other drugs. Information on specific type of medication and dosage is included in Appendix B.

The normal control Ss represented a wide range of occupational pursuits. Eleven were contacted through the recommendation of a psychologically sophisticated minister who had cooperated in previous Worcester State Hospital studies of normal behavior, and was familiar with the backgrounds of his parishioners. Four other Ss were recruited through community organizations (e. g., Boy Scout leaders) and one,

through an Army Reserve unit. None of those participating in the research were known to have histories of mental disorder, alcoholism, or deviant criminal behavior, nor were any believed to be in need of psychiatric attention. All voluntarily served as subjects, and were paid on an hourly basis for their services.

The schizophrenic Ss were drawn from 15 different hospitals, mostly in the New England area (see Appendix C). Failure to meet the requirement of a two-year maximum limit for initial hospitalization automatically ruled out a very high proportion of the hospitalized schizophrenic population. Almost as difficult a criterion to satisfy was the absence of ataractic drug therapy for two of the patient groups; in some hospitals virtually all recently admitted schizophrenics were on some type of tranquilizer. To reduce the number of cases disqualified because of case history data too insufficient for reliable premorbid ratings, a personal interview was sometimes conducted with subjects.[1] When included, this procedure was carried out only at the termination of the final session in order to eliminate any untoward effects upon test

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[1] Rodnick and Garmezy (1955) have reported a rank order correlation of .78 and a Pearson product moment correlation of .88 between premorbid ratings derived through interviews with patients and those based on case history data. With 15 as the cut-off score for a good premorbid rating, not a single inversion occurred in their dichotomous groupings. Thus, when 13 and 17 are used as the cut-off points for good and poor groups, respectively, such an inversion should be even less likely to occur.

performance. Since it was often not possible to assess in advance the subjects' conformity with the criteria established for the experiment, 21 patients had to be partially examined before being dropped from the study, usually because of inability to follow directions due to marked confusion, preoccupation, retardation, agitation, and the like. An additional 31 patients completed the entire experimental series but were subsequently excluded from the analysis because of matching considerations, intermediate-range Phillips scores, changes in final diagnosis, etc. The number of Ss in each group omitted from the final sample, with reasons for exclusion, is presented in Appendix D. Test records were scored and analyzed only after the final sample had been determined.

As can readily be observed in Table I, the four groups were closely matched on mean age, education, and WAIS vocabulary scores. Moreover, the two poor premorbid groups were comparable in their average Phillips ratings, while all three patient groups were similar with respect to lapse of time, in months, since first hospitalization for psychosis. Initial hospitalization, of course, is not identical with onset of illness which may have developed so gradually that no point of onset can be determined. In particular, poor premorbid Ss are apt to have life-long patterns of tenuous adjustment, with pathological symptomatology sometimes manifesting itself years before institutionalization. To some extent, this observation is reflected in the sub-type diagnostic classification of the schizophrenic groups. Five Ss were diagnosed as "chronic" even though

Table 1

A Comparison of the Subject Groups on Certain Control Variables

(N = 16 Ss per group)

Control variable	Schizophrenic patient groups			Normal control group
	GPM	FPM	D-PPM	
Age:				
Mean	29.31	29.69	30.25	29.25
S. D.	5.26	7.08	5.25	5.75
Range	21-38	18-44	20-37	18-39
Education--years completed:				
Mean	12.00	11.25	11.56	12.00
S. D.	3.26	1.68	2.42	1.70
Range	7-20	8-14	8-16	9-16
WAIS vocabulary--weighted scores:				
Mean	11.00	11.25	11.31	11.13
S. D.	2.50	1.82	2.52	1.96
Range	7-16	8-16	7-16	7-15
Phillips Scale ratings:				
Mean	9.38	22.13	21.83	
S. D.	2.45	2.74	2.23	
Range	3-13	17-26	18-27	
Months since first admission:				
Mean	8.17	8.39	9.09	
S. D.	10.17	7.51	7.36	
Range	.25-37	.75-27.5	.5-23	

they were all first admissions; none of those so designated came from the GPM group (see Table 2). More detailed personal data for each subject are given in Appendix B.

Stimulus-materials

The method employed in this investigation represents a modification of the concept-attainment technique (Bruner, Goodnow, and Austin, 1956), adapted for use with schizophrenic patients of a wide range of intellectual ability. A total of five independent sets of 16 pictures each, comprised the experimental series, as follows:

1) Neutral set (Neut)-- consisting of two non-human figures, i.e., a table and chair;

2) Positive Mother set (P-M)-- representing a positively toned mother-son interaction, i.e., a smiling, nurturant parent figure;

3) Negative Mother set (N-M)-- portraying a negatively toned mother-son relationship, i.e., a frowning, censuring parent;

4) Positive Father set (P-F)-- analogous in affective tone to P-M; and

5) Negative Father set (N-F)-- analogous in affective tone to N-M.

In addition, a Sample set, involving two geometric figures, was used for orientation and training purposes. This set also served to identify subjects with sensory defects or attentional difficulties of sufficient magnitude to preclude valid test participation.

Table 2

Number of Ss in Each Schizophrenic Patient Group Classified According to Diagnostic Sub-type

Diagnostic sub-type	GPM group	PPM group	D-PPM group	All groups combined
Paranoid	8	5	6	19
Schizo-affective	4	1	2	7
Acute undifferentiated	3	2	1	6
Chronic or chronic undifferentiated	0	3	2	5
Catatonic	0	1	1	2
Simple	0	1	1	2
Hebephrenic	0	0	1	1
Other, i. e., mixed, none, residual, undetermined	1	3	2	6
Total	16	16	16	48

Each set of 16 pictures always exhibited the following attributes:

1) the smaller of two figures could vary in some specific feature;

2) the larger figure could also vary in some definite respect;

3) some other aspect of the larger figure could be white or black; and

4) some background feature could be white or black.

By way of illustration, the Negative Mother set will be described in some detail (see Fig. 1). Each picture portrays a boy and a frowning mother. In half of the instances the boy has his hand behind his back; in the other half, to his side. Similarly, the mother may have both hands on her hips or else she has one arm raised in a scolding position. Irrespective of her stance, the mother is wearing either a white or a black apron. Lastly there is a floor panel (the background feature) which may also be white or black. Specific variations within all of the sets are listed in Table 3, while representative examples from each set are depicted in Fig. 2.

There were thus a maximum of four discriminable features which might vary from one picture to another within any single set. Among a set of 16 pictures, various combinations had one or more features in common. For *simple concepts*, eight of the pictures always had one common attribute as, for example, "white apron" in the N-M set. By contrast, *complex concepts* were represented by the joint presence of two different specific features, which could appear together in only four

Figure 1

The Negative Mother picture set.

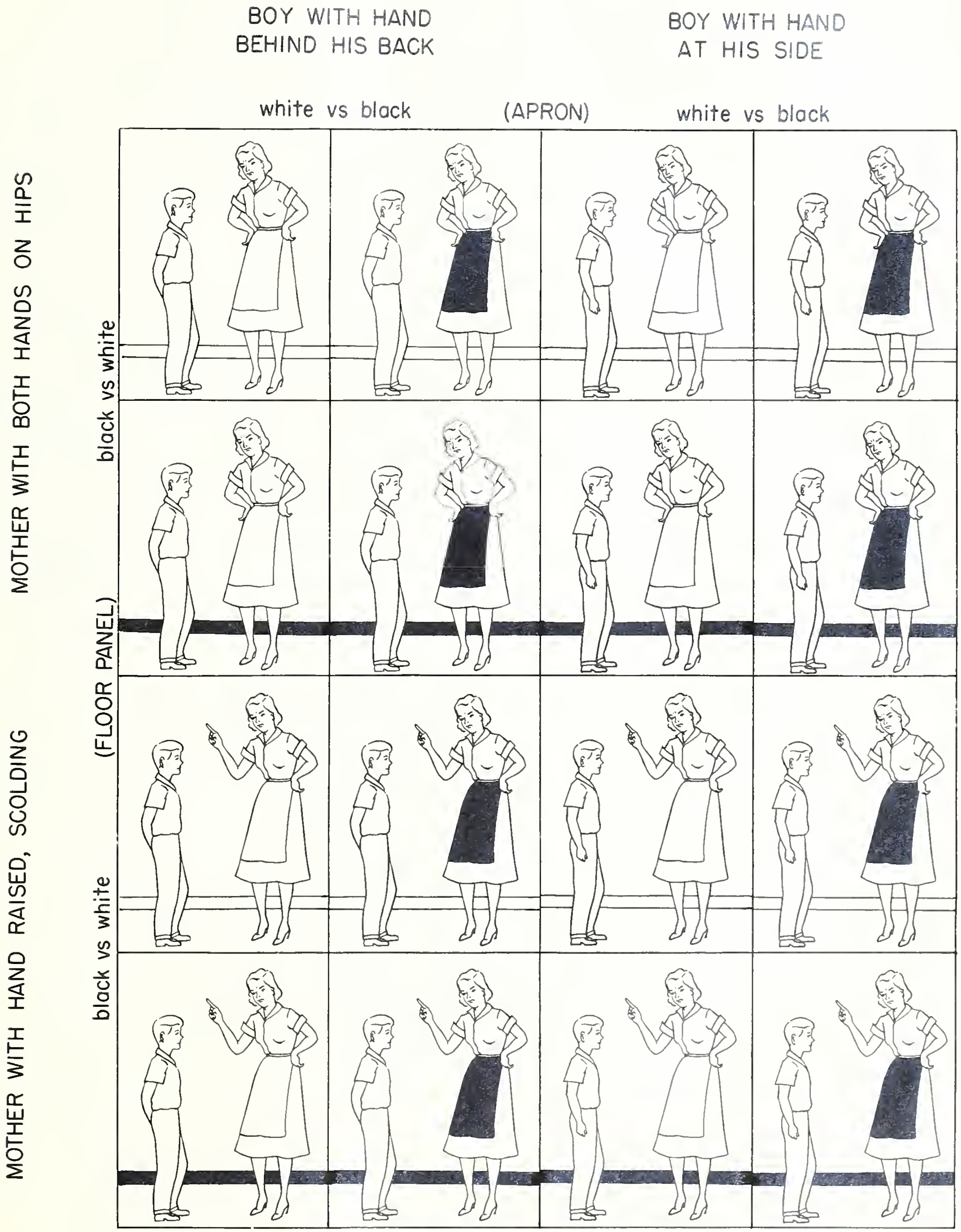

BOY WITH HAND BEHIND HIS BACK
BOY WITH HAND AT HIS SIDE
white vs black
(APRON)
white vs black
MOTHER WITH BOTH HANDS ON HIPS
MOTHER WITH HAND RAISED, SCOLDING
black vs white
(FLOOR PANEL)
black vs white

Table 3

Variations within Each Set of Sixteen Pictures

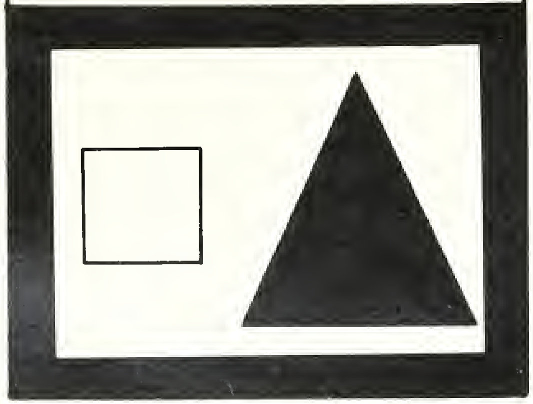
Set	Small figure	Large figure	Large figure	Background feature
Sample	circle or square	diamond or triangle	white or black figure	white or black border
Neutral	chair with or without arms	table with or without cloth	white or black vase	white or black rug
Positive-Mother	boy with hand behind back or at side	mother with hand at side or giving glass	white or black apron	white or black floor panel
Negative-Mother	"	mother with both hands on hips or one arm raised (scolding)	"	"
Positive-Father	"	father with hand at side or giving glass	white or black tie	"
Negative-Father	"	father with both hands on hips or one arm raised (scolding)	"	"

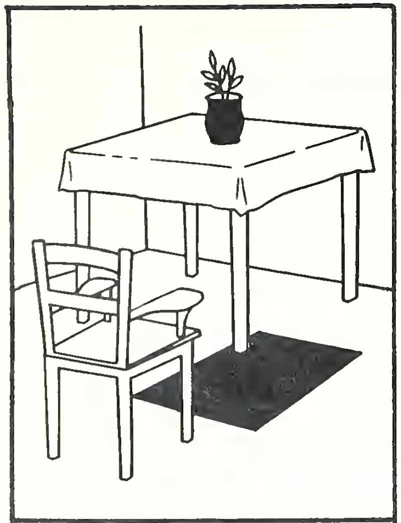
Figure 2

A representative example from
each of the six picture sets.

(Each picture shown comes from a comparable
location within its respective set.)

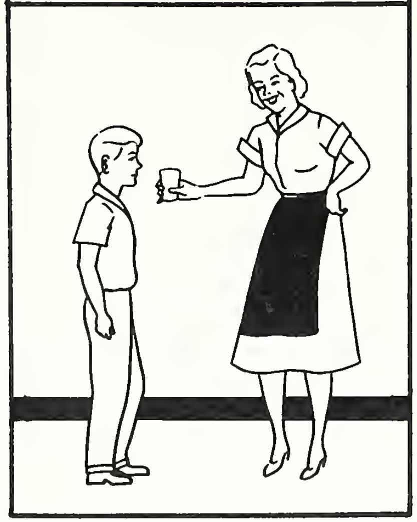
Sample



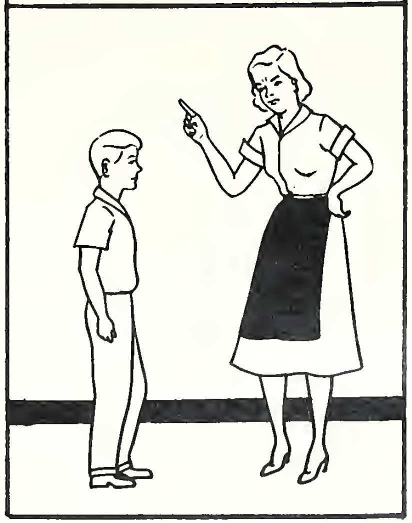


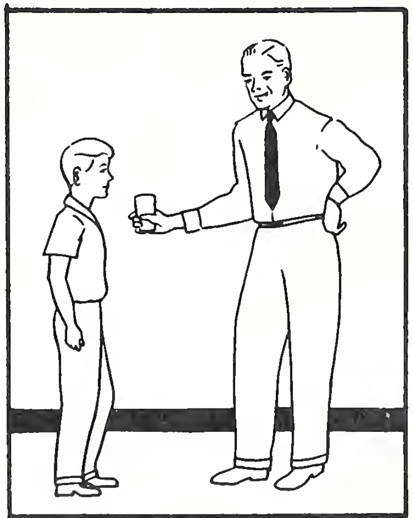
Neutral

Positive Mother

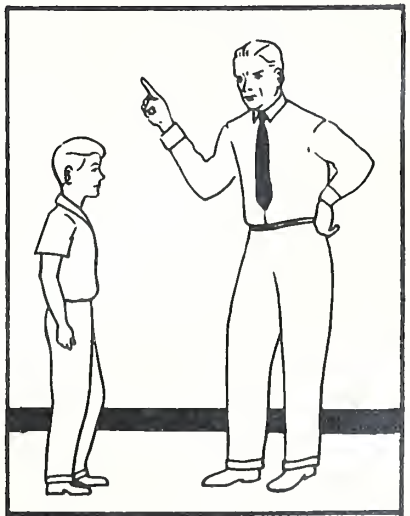


Negative Mother





Positive Father



Negative Father

pictures. An example on the N-M set might be "mother with both hands on her hips and black floor panel."

To insure maximum comparability in the non-variant aspects of pictures within a particular set, the drawings were photographically reproduced. The photographs were subsequently mounted on heavy cardboard and covered with a transparent protective paper to enhance their durability.[2] The size of each individual picture was approximately 3 inches by 4 inches.

Experimental Design

Each participant was tested on the entire experimental series, and so served as his own control from one set of pictures to another. The length of the procedure required two test sessions. In the first session, the Sample set was always administered initially, followed by two parental sets which differed from one another in sex of parent and affective tone. In the second session, a few brief items from the Sample set were given, at the outset, to serve as a "refresher." The Neutral set was then presented, followed by the two remaining parental sets. The order of the parental sets was interchanged among the various Ss as a control for effects of earlier parent-child themas upon subsequent

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[2] The particular coating used, sold under the tradename of "Copy-zip," was easy to apply, long-lasting, and relatively inexpensive. It reduced the high gloss of the prints and imparted a washable surface that was resistant to smudges and fingerprints.

ones. There were thus eight sequences of presentation, which were later collapsed into four, for purposes of analysis (see Table 4).

Sixteen Ss (four from each diagnostic group) were assigned to each of the four sequence combinations. Within each of these sequence categories, the subjects were closely matched on mean age, education, and WAIS vocabulary scores, as evidenced in Table 5. An attempt was also made to maintain comparability on these variables within each of the 16 sequence x diagnostic group cells, i.e., the four normal Ss given Sequence a, the four normal Ss given Sequence b, etc. Individual cell means appear in Appendix B. The grand mean of these cell means, for age, was 29.63, with a S.D. of .51 and a range of 27.75 to 31.25. For education, the overall average number of years completed was 11.70, with a cell-mean S.D. of .66 and a range of 10.25 to 13.25. Finally, for weighted vocabulary scores, the average cell-mean was 11.17, with a S.D. of .43 and a range of 10.25 to 11.75.

A diagrammatic representation of the experimental design for the various subject groups is shown in Fig. 3.

Experimental Procedure

All Ss were individually tested in a private room containing a table, desk, or work surface designed to enable the Examiner to sit directly opposite the respondent. Subjects were generally informed that their help was desired in the standardization of a new test procedure. It was emphasized to patients that their participation in the study was

Table 4

Sequences in which Experimental Test Sets Were Presented

Sequence code	Session I		Session II		
	1st set	2nd set	3rd set	4th set	5th set
a: 1	Pos-M	Neg-F	Neut	Pos-F	Neg-M
2	Pos-M	Neg-F		Neg-M	Pos-F
b: 1	Neg-M	Pos-F	Neut	Neg-F	Pos-M
2	Neg-M	Pos-F		Pos-M	Neg-F
c: 1	Pos-F	Neg-M	Neut	Neg-F	Pos-M
2	Pos-F	Neg-M		Pos-M	Neg-F
d: 1	Neg-F	Pos-M	Neut	Neg-M	Pos-F
2	Neg-F	Pos-M		Pos-F	Neg-M

Reduced to four sequences as follows:

a: P-M→N-F/N-M↔P-F

b: N-M→P-F/P-M↔N-F

c: P-F→N-M/P-M↔N-F

d: N-F→P-M/N-M↔P-F

Explanation of symbols

Slash sign (/) separates the sessions.

Single arrow (→) indicates that the set to the right of the arrow always followed the one to the left.

Double arrow (↔) indicates that for half of the Ss, one set preceded the other and for the remainder, the sequence was reversed.

Table 5

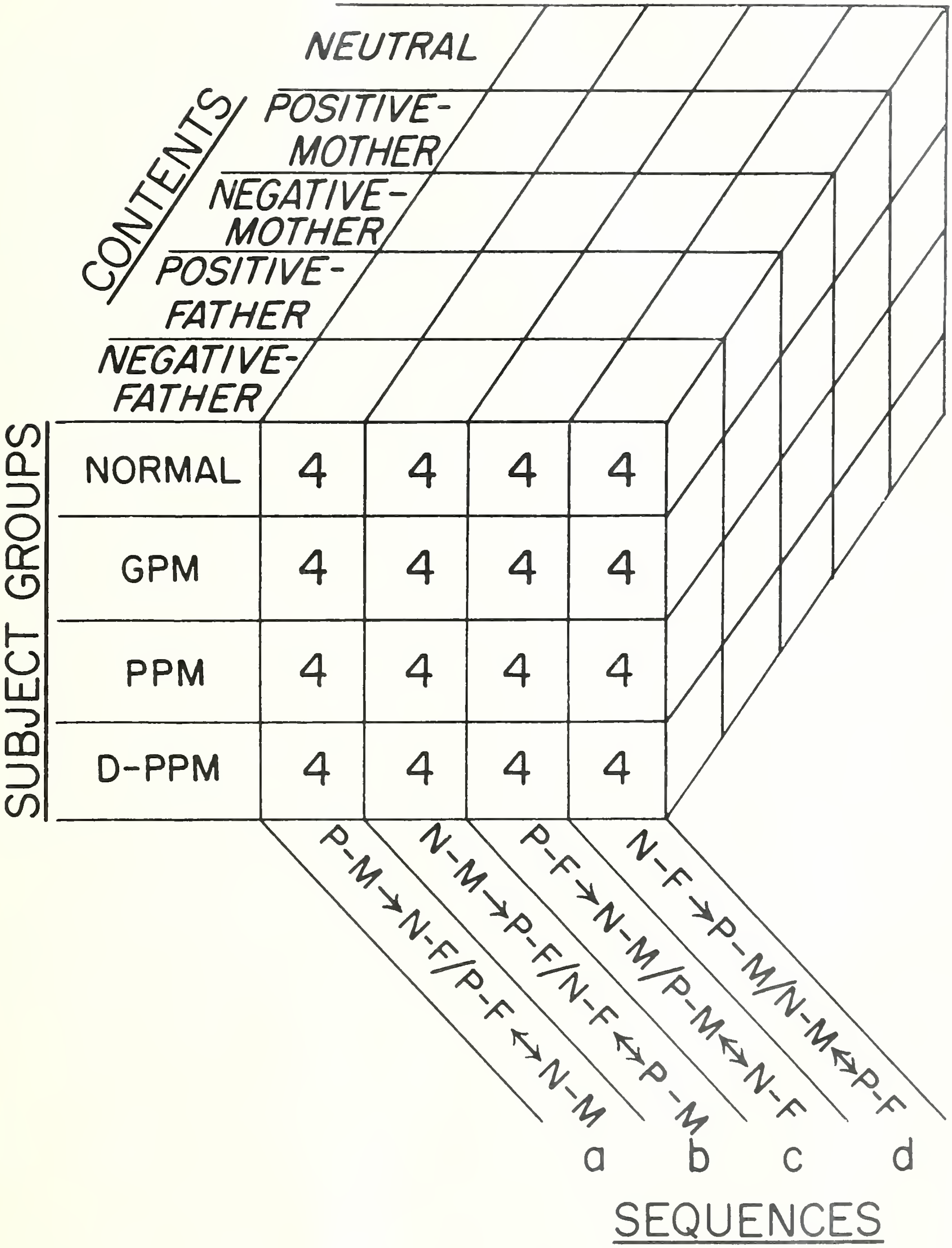
A Comparison of the Subjects within Four Sequence Categories on Certain Control Variables

(N = 16 Ss per category)

Control variable	Sequence a	Sequence b	Sequence c	Sequence d
Age:				
Mean	29.75	29.19	29.69	29.88
S. D.	6.03	6.36	4.18	6.68
Range	20-38	18-39	23-37	18-44
Education--years completed:				
Mean	11.81	12.00	11.44	11.56
S. D.	2.53	2.83	2.09	1.90
Range	7-18	9-20	8-16	8-15
WAIS vocabulary--weighted scores:				
Mean	11.25	11.06	11.44	10.94
S. D.	2.30	2.63	1.97	1.89
Range	7-16	7-16	8-15	7-16

Figure 3

Diagrammatic representation of the experimental design.


NEUTRAL
POSITIVE-MOTHER
NEGATIVE-MOTHER
POSITIVE-FATHER
NEGATIVE-FATHER
CONTENTS
SUBJECT GROUPS
NORMAL
GPM
PPM
D-PPM
4
P-M→N-F/P-F↔N-M
N-M→P-F/N-F↔P-M
P-F→N-M/P-M↔N-F
N-F→P-M/N-M↔P-F
a
b
c
d
SEQUENCES

voluntary and would not in any way affect their hospitalization status. The tests were administered to the patients in two sessions, usually on consecutive days. For the normal subjects, two to seven days intervened between sessions. Depending upon the S's rate of performance, the length of a session varied from 40 minutes to beyond 2-1/2 hours. Typically, the second session was shorter than the first. The WAIS vocabulary subtest (Wechsler, 1955) was ordinarily presented at the end of the first session although in some cases it was given at the outset, in order to determine the sequence of test presentation. When time permitted, an informal interview was conducted after completion of the last set, to elicit the Ss' attitudes toward the experimental proceedings. Also at this time, information relevant to premorbid ratings might be sought. Candy and cigarettes were freely provided throughout both test periods.

As a means of orienting the Ss to the experimental technique, the Sample set of pictures was always the initial one presented. On this set only, errors were corrected as they occurred, in order to insure that the nature of the task would be fully understood. Six successively graded steps of difficulty were introduced, as follows:

1) Location of Simple Concepts-- All 16 pictures were placed before the subject in a systematically arranged pattern. The variant features within the set were explicitly described by the Examiner. As each commonality or concept was called to the subject's attention, he was asked to indicate all the pictures on which that feature was present.

2) Identification of Simple Concepts-- The Examiner removed one picture from the set, the so-called Exemplar, and placed it to the S's right-hand side of the set. This picture, the S was told, belonged with some others in a particular way that was written on the concealed side of a card (the "concept card"). Two additional pictures which illustrated the concept on the card, and hence represented positive instances of the concept, were placed on the same side as the Exemplar. To the S's left were placed two pictures which did not exemplify the commonality on the card, and hence represented negative instances of the concept. The subject was then required to guess the answer on the card and to help him do so, was given the rule that the answer would "fit" all of the pictures to his right, but none of those to his left. As soon as he was successful, the answer on the concept card was exposed, to provide immediate reinforcement. Before each new concept was presented for solution, the pictures were always replaced, and ones appropriate to the new concept were removed, as described.

3) Attainment of Simple Concepts (with several aids)-- In this step, the Examiner removed from the set an Exemplar plus one other picture illustrative of the concept on the card, and placed these on the S's right, or positive side, of the set. To the left, or negative side, was placed one picture which did not contain the appropriate feature. Again, the S's task was to ascertain the answer on the concept card, and the same guiding rule as above was reiterated. However, in contrast to the

S's more passive role in Step 2, he was now required to begin by selecting a picture of his own choice from the set. If this choice represented a positive instance of the concept being sought, it was placed by the Examiner on the positive side of the set, and if a negative instance of that concept, on the negative side. The S was then required to guess the answer, and if unsuccessful, continued to select other pictures one at a time, each followed by his hypothesis, until he was able to state the correct concept. It was, incidentally, emphasized to the subject that selections placed on the negative side were not to be regarded as errors since, in eliminating certain possibilities, such pictures might help him to guess the answer.

4) Attainment of Simple Concepts (with minimal aid)-- The sole difference between this level and the one preceding it was that the Examiner began with only one Exemplar. All subsequent choices were made by the subject.

5) Identification of Complex Concepts-- At this point, complex concepts were introduced through the explicit example of four pictures which shared in common two different features. The Examiner then removed three pictures from the set which contained the joint presence of two characteristics, and placed these on the positive side of the set. The subject was required to identify the appropriate complex concept appearing in these pictures, and then to locate the remaining positive instance of this concept.

6) Attainment of Complex Concepts-- This step was analogous to the attainment of simple concepts, with the use of only one Exemplar. The subject was explicitly informed, however, that the answer on the concept card contained two parts. Both parts, he was told, would have to "fit" all of the pictures placed to his right side, but would never be jointly present in any of those placed to his left.

In the experimental sets proper, only Steps 1, 4, and 6 were applied. For each set, the 16 pictures were placed before the subject on a specially designed test board, which is schematically sketched and more fully described in Appendix E. The relevant potential concepts were always specifically indicated, as in Step 1, above. Two simple and six complex concepts were then presented for solution, with only one Exemplar to initiate each concept, as in Steps 4 and 6, respectively. Once a subject's selected pictures had been placed by the Examiner on the positive or negative side of the test board, they remained in these positions in continual view, until the particular solution was reached. Guesses, on the other hand, were recorded in writing and were no longer directly accessible to the subject. Directions were repeated, as required, throughout all phases of the test. The specific instructions, as given to the Ss, are presented in Appendix F.

In the experimental series, the simple concepts were included primarily as a means of further orienting Ss to each new set; in the analyses, only complex concepts were considered. The concepts offered for solution were counterbalanced with regard to the aligament of

component instances both within and between the individual sets. The location of Exemplars, too, was systematically varied within each set. For the actual concepts, Exemplars, and counterbalancing features, as well as a listing of all potential concepts, consult Appendix G.

Scoring of Incorrect Hypotheses

Whenever a subject's selection from the set had been placed on the appropriate side of the test board, he was required to give one guess as to the concealed answer on the concept card. Upon the initial presentation of an Exemplar, any one of six complex concepts was potentially correct. As the subject continued to select other pictures and advance hypotheses, there was obviously a corresponding reduction in the number of feasible alternatives among which he had to choose. In actuality, through a shrewd and judicious selection of pictures, any complex concept could be correctly arrived at by the S within two choices (see Appendix H). For scoring purposes, a verbal response was considered incorrect only if it went counter to information currently available to the subject. It was not so designated if it failed to coincide with the printed answer but represented a potentially acceptable guess at the time it was proposed. (Since number of guesses to solution, per se, could not take into account the rationality of the guesses, it was not deemed as sensitive an index of conceptual performance as the measures just described.) Basically, four types of incorrect hypotheses, as herein defined, could occur:

1) Negative error-- the concept offered by the S was present on one or more of the negative instances, in contradiction to the stated rule;

2) Positive error-- the guess was inappropriate because it failed to exemplify all the positive instances, as required by the rule;

3) Repetitive error-- a hypothesis already rejected as incorrect was repeated; if the same hypothesis was given on consecutive trials, the error was classified as "Successively Repetitive"; and

4) Idiosyncratic error-- the guess did not correspond with the concepts explicitly indicated as relevant possibilities at the outset of each set of pictures. Such a response might involve a descriptive feature which did not vary within a particular set (e.g., "she has a scolding look") or else be blatantly inappropriate (e.g., "his shirt is cleaner").

These four error types were not mutually exclusive; a single hypothesis might be incorrect on several counts.

Chapter IV

RESULTS

Whenever the analyses of variance, to be reported in this chapter, revealed sources of variation significant at the .10 level or better, individual treatment means were compared through "critical difference" tests (Lindquist, 1953). In the few instances where comparisons were made between groups of unequal size, t tests were applied. Both types of tests were based on the original error terms. Since, however, tests of homogeneity of variance between individual treatments were not carried out, the reported probability levels should conservatively be regarded as only approximations of the true level. Unless otherwise indicated, tables summarizing the data include the findings of D-PPM Ss. However, their performance will be specifically referred to only in a separate section where it will be contrasted with that of PPM Ss. Results of any statistical tests which are not presented in the main body of the text will be found in Appendix J.

Number of Incorrect Hypotheses

The overall data for number of incorrect hypotheses were initially subjected to a Lindquist (1953) Type III analysis of variance.[1] This design permitted an assessment of three factors: A- five Contents; B- four Diagnostic Groups; and C- four Sequences of Presentation. The results, summarized in Table 6, revealed significant trends for Diagnostic Groups, interaction between Contents and Sequences, and a triple interaction among all three variables. Scores for individual Ss on each picture set are given in Appendix I.

Diagnostic Groups

Comparisons between mean numbers of incorrect hypotheses for the diagnostic groups are presented in Table 7. Normal Ss gave significantly fewer incorrect hypotheses than did PPM Ss over all conditions combined. The GPM Ss occupied an intermediate and non-significant position between the other groups. This relative ordering of subject

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[1] When a Cochran's test of homogeneous variance (Dixon and Massey, 1957) was applied to the 80 cell mean variances (4 Ss per cell), the obtained value of .0798 did not exceed the tabled value at the 95th percentile for k = 60. Consequently, heterogeneity would not seem to have been sufficiently marked to invalidate the analysis of variance procedure. In any case, Boneau (in press) has argued persuasively that violations of the assumptions of homogeneity of variance and normality have only minimal effects upon the validity of probability statements so long as sample sizes are equal, or nearly so, and the underlying populations do not differ markedly from one another in skew.

Table 6

Analysis of Variance of Number of Incorrect Hypotheses

Source	*df*	Mean square	*F*	*P*
Between *S*s	63			
Groups (G)	3	48.4125	2.48	<.10
Sequences (S)	3	3.8542	--	--
G x S	9	17.8208	--	--
error (b)	48	19.5479		
Within *S*s	256			
Contents (C)	4	8.7938	1.54	<.20
C x G	12	5.4542	--	--
C x S	12	9.2083	1.61	<.10
C x G x S	36	8.0188	1.40	<.10
error (w)	192	5.7250		
Total	319			

Table 7

Comparisons between Mean Numbers of Incorrect Hypotheses for Each Diagnostic Group

Group	Mean
Normal	1.78
GPM	2.68
PPM	3.43
D-PPM	3.40

Between-group comparisons	Diff.	P
Normal vs. GPM	--	n. s.
Normal vs. PPM	1.65	.025
Normal vs. D-PPM	1.62	.025
GPM vs. PPM	--	n. s.
GPM vs. D-PPM	--	n. s.
PPM vs. D-PPM	--	n. s.

Note.--N = 80 treatments per group (16 Ss x 5 Contents); df = 48; n. s. at P = .20.

groups is wholly congruent with that consistently disclosed in previous experimental investigations of the behavior under stress of poor and good premorbid schizophrenics. Differences between the groups can apparently be extended to include the area of conceptual functioning.

Contents

As shown in Table 6, Contents alone were significant at only the .20 level. Subsequent comparisons (see Table 8) indicated that significantly better performance occurred on the Neutral set than on either the Positive Mother or Negative Father sets. In no case, however, was a particular parent set significantly differentiated from any other one. This finding suggests that the four classes of parental stimuli may have been equated in difficulty, as originally intended.

Test Session Effects

The initial analysis indicated an interaction trend between Contents and Sequences of Presentation (see Table 6). In order to determine whether content effects may have become attenuated during the course of the experiment, this trend was examined through the method of orthogonal comparisons (Edwards, 1950). The essence of this method consists in the subdivision of the degrees of freedom associated with the interaction term into single independent components. In the present instance, a single highly significant component was found to be responsible for the overall interaction trend. Significantly more incorrect hypotheses were advanced for parent sets presented during the first session than for

Table 8

Comparisons between Mean Numbers of Incorrect Hypotheses for Each Content

Content	Mean
Neut	2.30
Pos-M	3.23
Neg-M	2.69
Pos-F	2.77
Neg-F	3.11

Between-content comparisons	Diff.	P
Neut vs. Neg-F	.81	.10
Neut vs. Pos-F	--	n. s.
Neut vs. Neg-M	--	n. s.
Neut vs. Pos-M	.93	.05
Pos-M vs. Neg-F	--	n. s.
Pos-M vs. Pos-F	--	n. s.
Pos-M vs. Neg-M	.54	.20
Neg-M vs. Neg-F	--	n. s.
Neg-M vs. Pos-F	--	n. s.
Pos-F vs. Neg-F	--	n. s.

Note.--N = 64 treatments per content (16 Ss × 4 groups); df = 192; n. s. at P =.20.

those administered in the second session, at $p < .0005$ (see Appendix J, Table 1). Generally then, Ss improved in performance when they had had previous experience with the conceptual components of the task, i.e., parental and affective, even though the exact combination of these components was never duplicated from one set to another. This relationship is shown in Fig. 4. The marked significance of this difference in performance as a function of test session is also indicated in Table 9.

Ordinal Position of Picture Sets. Further highlighting the effects of test session were analyses of the ordinal position of picture sets. Ordinal position refers to the temporal occurrence of a set within the series, i.e., whether first, second, third, etc., irrespective of content. That it was a highly significant source of variance can be seen in Table 10. Critical difference tests, summarized in Table 11, indicate that the first and second sets given in Session I, each differed significantly from every set given in Session II. At the same time, within either session, no significant differences between any sets obtained.

The mean number of incorrect hypotheses on picture sets according to ordinal position is represented graphically for three subject groups in Fig. 5. From inspection of the figure it can be seen that improvement as a function of test session occurred for each group, and that the same relative standing among groups was maintained on each ordinal position. It can also be noted that the normal Ss improved in performance from the

Figure 4

Mean number of incorrect hypotheses on parental sets according to test session.

(Each column represents means for 32 Ss.)

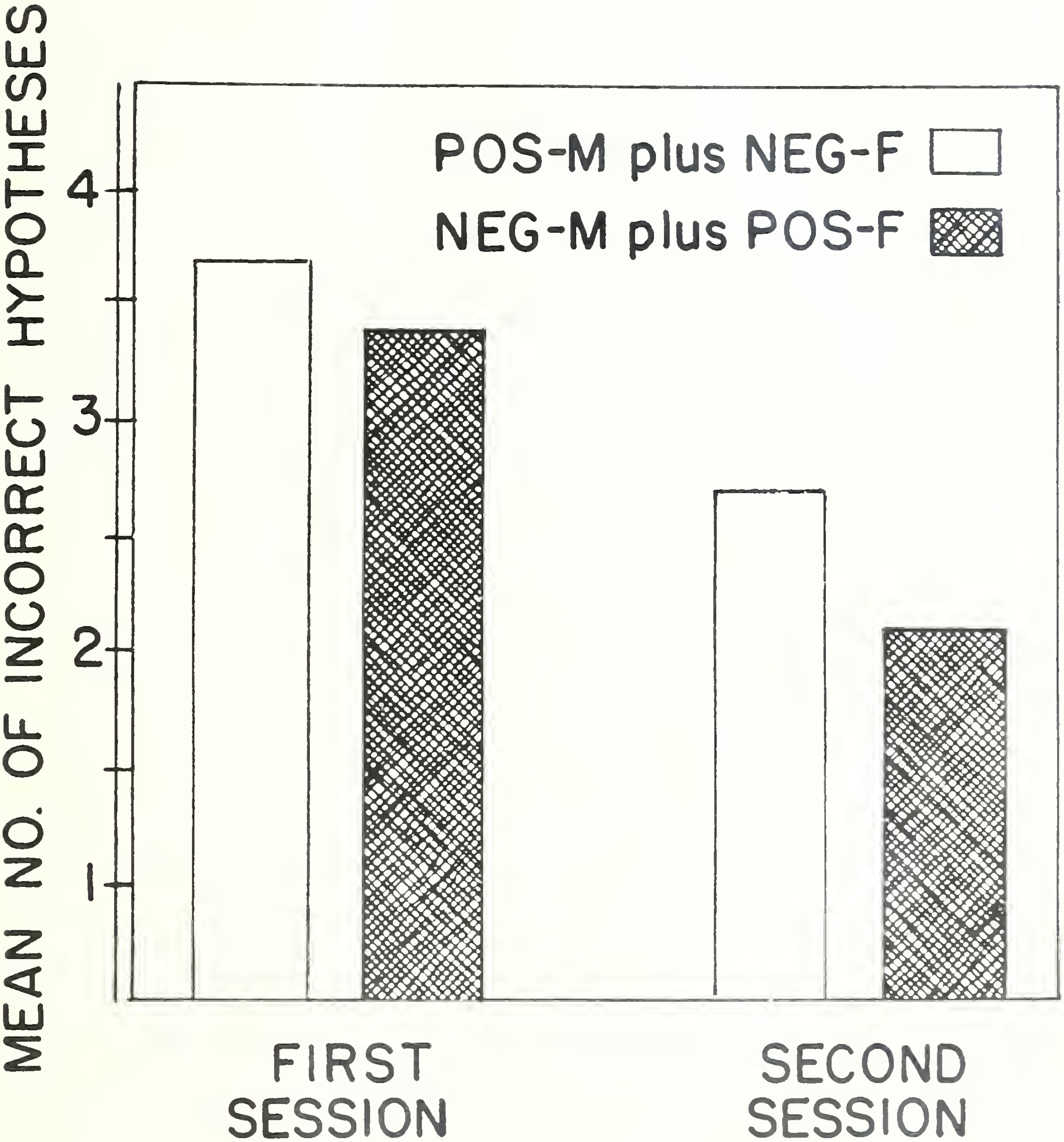

MEAN NO. OF INCORRECT HYPOTHESES
4
3
2
1
POS-M plus NEG-F
NEG-M plus POS-F
FIRST SESSION
SECOND SESSION

Table 9

Analysis of Variance of Number of Incorrect Hypotheses According to Test Session

Source	*df*	Mean square	*F*	*P*
Between *Ss*	63			
Groups (G)	3	19.6633	2.44	<.10
error (b)	60	8.0668		
Within *Ss*	64			
Test Sessions (T)	1	42.3200	17.65	<.0005
T x G	3	1.2767	--	--
error (w)	60	2.3972		
Total	127			

Table 10

Analysis of Variance of Number of Incorrect Hypotheses According to Ordinal Position

Source	*df*	Mean square	*F*	*P*
Between *Ss*	63			
Groups (G)	3	48.4125	2.62	<.10
error (b)	60	18.5042		
Within *Ss*	256			
Ordinal Posit. (O)	4	26.2859	4.31	<.005
O x G	12	2.5401	--	--
error (w)	240	6.0974		
Total	319			

Table 11

Comparisons between Mean Numbers of Incorrect Hypotheses for Each Ordinal Position

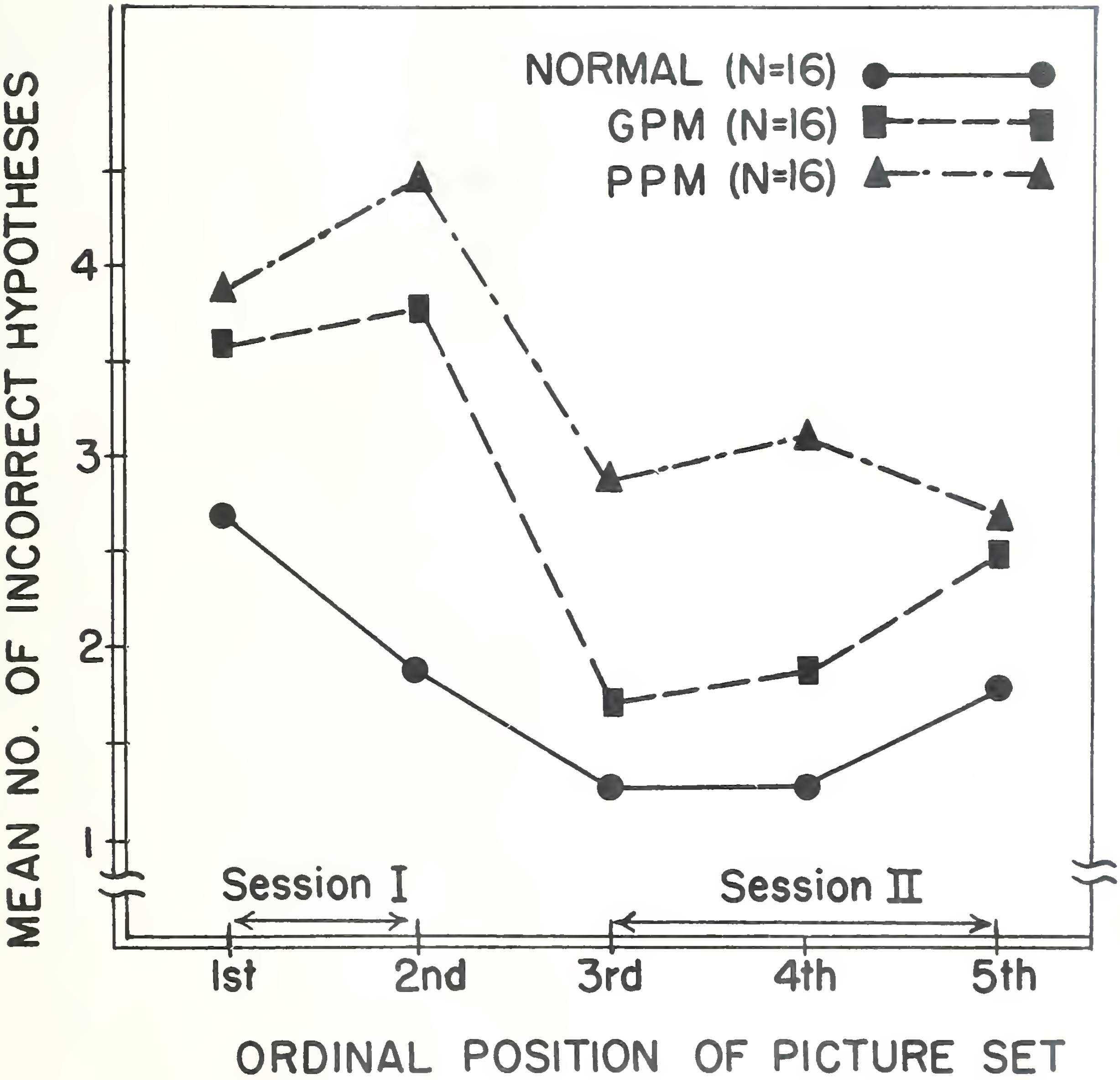
Ordinal position	Mean
First	3.42
Second	3.59
Third	2.30
Fourth	2.25
Fifth	2.53

Between-order comparisons	Diff.	*P*
1st vs. 2nd	--	n. s.
1st vs. 3rd	1.12	.01
1st vs. 4th	1.17	.01
1st vs. 5th	.89	.05
2nd vs. 3rd	1.29	.005
2nd vs. 4th	1.34	.005
2nd vs. 5th	1.06	.025
3rd vs. 4th	--	n. s.
3rd vs. 5th	--	n. s.
4th vs. 5th	--	n. s.

Note. -- *N* = 64 treatments per ordinal position (16 *Ss* x 4 groups); *df* = 240; n. s. at *P* = .20.

Figure 5

Mean number of incorrect hypotheses on picture sets for normal, GPM and PPM subject groups, as a function of ordinal position.


NORMAL (N=16)
GPM (N=16)
PPM (N=16)
MEAN NO. OF INCORRECT HYPOTHESES
1
2
3
4
Session I
Session II
1st
2nd
3rd
4th
5th
ORDINAL POSITION OF PICTURE SET

first to the second set, whereas the patient groups showed a slight increase in the number of errors. None of these changes were significant but as a result of the differential directional shifts, the normal group was significantly more adequate in performance on the second set than either of the schizophrenic groups (see Table 12).

Since the Neutral set was always the third one in the series, evaluation of performance on the neutral pictures could be made by a comparison of group means on the third ordinal position. In this case, as indicated in Table 12, the difference between normal and PPM _S_s was significant at $p < .10$; GPM _S_s fell in an intermediate position.

Contents x Diagnostic Groups x Sequences

Whether or not poor and good premorbid schizophrenic patients would react differentially to stimuli depicting certain mother-son and father-son themas constituted the primary focus of the present investigation. Interaction between Diagnostic Groups and Contents, however, was not significant in the initial overall analysis. On the other hand, a trend toward a significant interaction, involving Sequences of Presentation in conjunction with the other two factors, was observed (see Table 6). Presumably then, the highly significant reduction in errors usually associated with parental figures in the second session did not hold for all groups on all contents. An explanation which might account for this is the possibility that improvement effects were attenuated for GPM _S_s on one or both father sets, and for PPM _S_s on the mother sets. To assess

Table 12

Comparisons between Mean Numbers of Incorrect Hypotheses for Each Diagnostic Group on the First Three Ordinal Positions

Group (N = 16 per group)	Means on the ordinal positions		
	First	Second	Third
Normal	2.69	1.88	1.25
GPM	3.56	3.75	1.69
PPM	3.94	4.50	2.94
D-PPM	3.50	4.25	3.31

Between-group comparisons[a]	Diff.	*p*
On the First Set:		
Normal vs. GPM	--	n. s.
Normal vs. PPM	1.25	.20
Normal vs. D-PPM	--	n. s.
GPM vs. PPM	--	n. s.
GPM vs. D-PPM	--	n. s.
PPM vs. D-PPM	--	n. s.
On the Second Set:		
Normal vs. GPM	1.87	.05
Normal vs. PPM	2.62	.005
Normal vs. D-PPM	2.37	.01
GPM vs. PPM	--	n. s.
GPM vs. D-PPM	--	n. s.
PPM vs. D-PPM	--	n. s.
On the Third (i. e., Neutral) Set:		
Normal vs. GPM	--	n. s.
Normal vs. PPM	1.69	.10
Normal vs. D-PPM	2.06	.025
GPM vs. PPM	1.25	.20
GPM vs. D-PPM	1.62	.10
PPM vs. D-PPM	--	n. s.

Note.--*df* = 240; n. s. at *p* = .20.

[a] Within each group, differences between 1st vs. 2nd sets were n. s.

the tenability of this supposition, *Ss* who had been given the Negative Mother and Positive Father sets in their initial session (Sequences N-M⇔P-F/P-M⇔N-F) were treated separately from those who had received the other parent sets on the first day (Sequences P-M⇔N-F/N-M⇔P-F). Results of these analyses are summarized in Tables 13 and 14, respectively. Effects of Contents x Sequences were thus partialled out within each subpopulation, permitting direct observation of Contents x Diagnostic Groups effects. At the same time, comparisons between the findings emerging from the independent analyses were still feasible.

Comparison of Contents x Diagnostic Groups for the Two Sequence Subpopulations. The main effects for the two independent sequence subpopulation analyses were not symmetrical; interaction between Contents and Diagnostic Groups was significant only on Sequences N-M⇔P-F/P-M⇔N-F (cf. Tables 13 and 14). Comparisons between the two analyses must therefore be interpreted with caution. Figure 6 compares the subject groups in terms of the number of incorrect hypotheses for the different parent sets, according to test sequences. It may be observed that in most instances the groups improved in performance on the pictures given in the second session, as expected. However, two exceptions occurred: 1) When the Negative Mother was given in the initial session, PPM *Ss* failed to improve on the Positive Mother set administered in the subsequent session, and 2) Similarly, when the Negative Father was given on the first day, GPM *Ss* did not

Table 13

Analysis of Variance of Number of Incorrect Hypotheses

on Sequences N-M↔P-F/P-M↔N-F

Source	*df*	Mean square	*F*	*P*
Between *S*s	31			
Groups (G)	3	55.5729	3.26	<.05
error (b)	28	17.0366		
Within *S*s	128			
Contents (C)	4	10.5531	2.38	<.10
C × G	12	8.2969	1.87	<.05
error (w)	112	4.4306		
Total	159			

Table 14

Analysis of Variance of Number of Incorrect Hypotheses

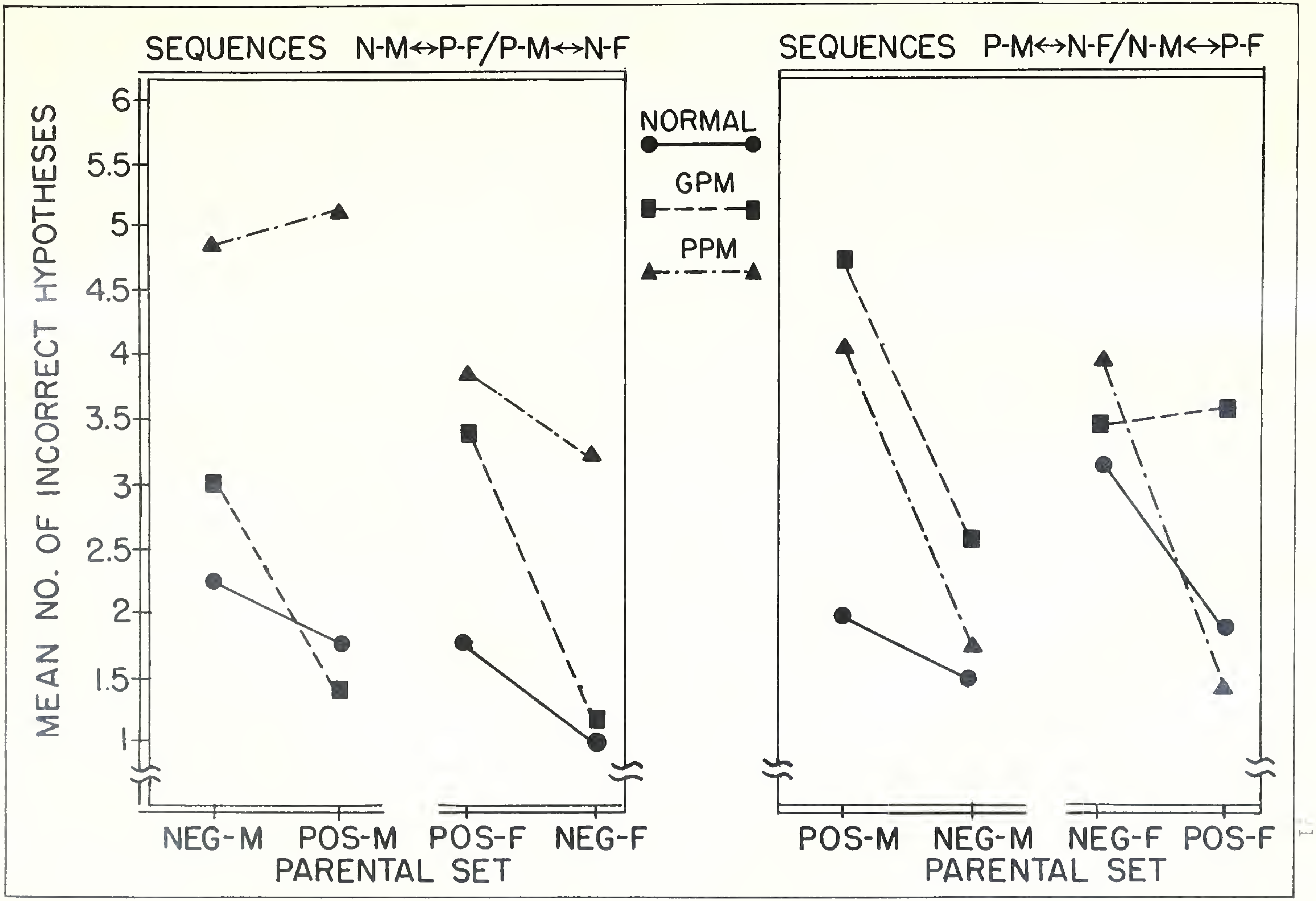
on Sequences P-M↔N-F/N-M↔P-F

Source	*df*	Mean square	*F*	*P*
Between *S*s	31			
Groups (G)	3	11.9396	--	--
error (b)	28	20.5688		
Within *S*s	128			
Contents (C)	4	21.1938	2.93	<.025
C x G	12	5.6063	--	--
error (w)	112	7.2317		
Total	159			

Figure 6

Mean number of incorrect hypotheses on mother and father sets for normal, CPM, and PPM subject groups according to test sequences.

(Each mean represents scores for 8 Ss. Lines between points connect means on the first session with those on the second.)


SEQUENCES N-M↔P-F/P-M↔N-F
SEQUENCES P-M↔N-F/N-M↔P-F
MEAN NO. OF INCORRECT HYPOTHESES
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
NORMAL
GPM
PPM
NEG-M
POS-M
POS-F
NEG-F
PARENTAL SET
POS-M
NEG-M
NEG-F
POS-F
PARENTAL SET

improve on the Positive Father set presented in the second session. It is possible, therefore, that if initial contact is with the negative set of the significant parent, performance on subsequent contact with the positive set is adversely affected. This interpretation would account for the finding that the PPM Ss, as a whole, performed less adequately on the Positive Mother, and the GPM Ss less adequately on the Positive Father than on the corresponding negative sets. The original hypothesis was that the cue relevant parent for deficit is the censuring mother for the former group, and the censuring father for the latter group.

Sequences N-M⇔P-F/P-M⇔N-F. For the Ss who received the Negative Mother and Positive Father sets in the first session, differences between Diagnostic Groups were in the anticipated direction. As indicated in Table 15, normal Ss made significantly fewer incorrect hypotheses than did the PPM group, while GPM Ss were in an intermediate position.

Content differences, too, were in accordance with expectation, as can be noted in Table 16. A significantly greater number of incorrect hypotheses were elicited by the parental sets given in the first session than by the Neutral set, presented on the second test day.

The relevant data for interaction effects of Contents x Diagnostic Groups are summarized in Table 17. On the Negative Mother set, the PPM Ss made more errors than did the normal or GPM Ss, with the difference in the latter case being significant at only the .10 level. On the subsequent Positive Mother, as noted earlier, only the PPM group

Table 15

Comparisons between Mean Numbers of Incorrect Hypotheses for Each Diagnostic Group on Sequences N-M$\Leftrightarrow$P-F/P-M$\Leftrightarrow$N-F

Group	Mean
Normal	1.53
GPM	2.13
PPM	3.95
D-PPM	3.68

Between-group comparisons	Diff.	*P*
Normal vs. GPM	--	n. s.
Normal vs. PPM	2.42	.025
Normal vs. D-PPM	2.15	.05
GPM vs. PPM	1.82	.10
GPM vs. D-PPM	1.55	.20
PPM vs. D-PPM	--	n. s.

Note.--*N* = 40 treatments per group (8 *Ss* x 5 Contents); *df* = 28; n. s. at *P* = .20.

Table 16

Comparisons between Mean Numbers of Incorrect Hypotheses for Each Content on Sequences N-M↔P-F/P-M↔N-F

Content	Mean
Neut	2.00
Pos-M	2.59
Neg-M	3.44
Pos-F	3.28
Neg-F	2.78

Between-content comparisons	Diff.	*P*
Neut vs. Neg-F	.78	.20
Neut vs. Pos-F	1.28	.025
Neut vs. Neg-M	1.44	.01
Neut vs. Pos-M	--	n. s.
Pos-M vs. Neg-F	--	n. s.
Pos-M vs. Pos-F	.69	.20
Pos-M vs. Neg-M	.85	.20
Neg-M vs. Neg-F	--	n. s.
Neg-M vs. Pos-F	--	n. s.
Pos-F vs. Neg-F	--	n. s.

Note.-- *N* = 32 treatments per content (8 *S*s x 4 groups); *df* = 112; n. s. at *P* = .20.

Table 17

Comparisons between Mean Numbers of Incorrect Hypotheses for Each Diagnostic Group on Each Content, on Sequences N-M⇔P-F/P-M⇔N-F

Group (N = 8 per group)	Means on each of the contents				
	Pos-M	Neg-M	Pos-F	Neg-F	Neut
Normal	1.75	2.25	1.75	1.00	.88
GPM	1.38	3.00	3.38	1.13	1.75
PPM	5.13	4.88	3.88	3.25	2.63
D-PPM	2.13	3.63	4.13	5.75	2.75

Comparisons	Diff.	*P*
Between Groups		
On the Neg-M Set:		
Normal vs. GPM	--	n. s.
Normal vs. PPM	2.63	.025
Normal vs. D-PPM	1.38	.20
GPM vs. PPM	1.88	.10
GPM vs. D-PPM	--	n. s.
PPM vs. D-PPM	--	n. s.
On the Pos-M Set:		
Normal vs. GPM	--	n. s.
Normal vs. PPM	3.38	.005
Normal vs. D-PPM	--	n. s.
GPM vs. PPM	3.75	.001
GPM vs. D-PPM	--	n. s.
PPM vs. D-PPM	3.00	.01
On the Neg-F Set:		
Normal vs. GPM	--	n. s.
Normal vs. PPM	2.25	.05
Normal vs. D-PPM	4.75	.001
GPM vs. PPM	2.12	.05
GPM vs. D-PPM	4.62	.001
PPM vs. D-PPM	2.50	.025

(continued)

Table 17 (continued)

Comparisons between Mean Numbers of Incorrect Hypotheses
for Each Diagnostic Group on Each Content,
on Sequences N-M⇔P-F/P-M⇔N-F

Comparisons	Diff.	*P*
Between Groups (continued)		
On the Pos-F Set:		
Normal vs. GPM	1.63	.20
Normal vs. PPM	2.13	.05
Normal vs. D-PPM	2.38	.05
GPM vs. PPM	--	n.s.
GPM vs. D-PPM	--	n.s.
PPM vs. D-PPM	--	n.s.
On the Neut Set:		
Normal vs. GPM	--	n.s.
Normal vs. PPM	1.75	.10
Normal vs. D-PPM	1.87	.10
GPM vs. PPM	--	n.s.
GPM vs. D-PPM	--	n.s.
PPM vs. D-PPM	--	n.s.
Within Groups		
For the Normal group:		
Pos-M vs. Neg-M	--	n.s.
Pos-F vs. Neg-F	--	n.s.
For the GPM group:		
Pos-M vs. Neg-M	1.62	.20
Pos-F vs. Neg-F	2.25	.05
For the PPM group:		
Pos-M vs. Neg-M	--	n.s.
Pos-F vs. Neg-F	--	n.s.
For the D-PPM group:		
Pos-M vs. Neg-M	1.50	.20
Pos-F vs. Neg-F	1.62	.20

Note. -- *df* = 112; n.s. at *P* = .20.

failed to improve and, in fact, showed a slight increase in errors. Consequently, the difference between this group and the others was highly significant; PPM *S*s were now inferior to the other subject groups at $p < .01$ or better. On the Positive Father pictures the PPM *S*s again made significantly more errors than did normal *S*s, while GPM *S*s occupied an intermediate, non-significant position. With introduction of the Negative Father in the second session, the latter *S*s approximated the performance level of normal *S*s; both groups now did significantly better than the PPM *S*s.

In summary, on Sequences N-M⇔P-F/P-M⇔N-F, both mother and father stimuli were associated with deficit performance in PPM schizophrenics relative to the other groups. The impact of the mother, however, was greater than that of the father.

Sequences P-M⇔N-F/N-M⇔P-F. For subjects given the Positive Mother and Negative Father sets in the initial session, only Contents was significant (see Table 14). Table 18 indicates that significantly more incorrect hypotheses were advanced on each of the parent sets administered on the first day than on either one presented in the second session. Moreover, in accordance with previous observations, no significant differences were found between parent sets presented within any single session.

Although the interaction between Contents and Diagnostic Groups was not significant, critical difference tests were applied in an attempt to discern any underlying trends (see Appendix J, Table 2). On mother

Table 18

Comparisons between Mean Numbers of Incorrect Hypotheses for Each Content on Sequences P-M$\leftrightarrow$N-F/N-M$\leftrightarrow$P-F

Content	Mean
Neut	2.59
Pos-M	3.88
Neg-M	1.94
Pos-F	2.25
Neg-F	3.44

Between-content comparisons	Diff.	P
Neut vs. Neg-F	--	n. s.
Neut vs. Pos-F	--	n. s.
Neut vs. Neg-M	--	n. s.
Neut vs. Pos-M	1.29	.10
Pos-M vs. Neg-F	--	n. s.
Pos-M vs. Pos-F	1.63	.025
Pos-M vs. Neg-M	1.94	.01
Neg-M vs. Neg-F	1.50	.05
Neg-M vs. Pos-F	--	n. s.
Pos-F vs. Neg-F	1.19	.10

Note.--N = 32 treatments per content (8 Ss x 4 groups); df = 112; n. s. at P = .20.

stimuli, the only notable group differences occurred on the positive set in the first session; both patient groups tended to make more errors than normal _Ss_, with the difference for GPM _Ss_ being significant at the .05 level. With regard to father pictures, the GPM group, as reported previously, failed to show improvement on the positive set in the second session. They now gave the greatest number of incorrect hypotheses relative to the other groups, with the difference from PPM _Ss_ being significant at the .10 level of confidence.

Resumé of Diagnostic Groups x Contents Trends for the Two Sequence Subpopulations. Several salient trends emerged from the independent analyses presented in the foregoing section: 1) The improvement usually associated with parental sets in the second session was not demonstrated by PPM _Ss_ on the Positive Mother set, nor by GPM _Ss_ on the Positive Father set; 2) Deficits shown by the PPM group, relative to the other subject groups, occurred on both mother and father stimuli, but were more pronounced on the mother pictures; 3) Deficits shown by GPM _Ss_, relative to the remaining subject groups, were most apparent on the Positive Father set in the second session; and 4) The impact of the mother pictures upon the PPM _Ss_ was more striking than that of the father pictures upon the GPM _Ss_.

Performance on Parental Sets According to Phillips Score Tertiles

To determine whether an intermediate group might fall between the good and poor premorbid schizophrenics in performance on the parental contents, the GPM and PPM _Ss_ were divided into tertiles in terms of

their Phillips scores (see Table 19). An analysis of variance of the number of incorrect hypotheses given on combined-mother vs. combined-father sets for the three groups disclosed a significant interaction at the .05 level of confidence, as shown in Table 20. The t tests (Appendix J, Table 3) indicated that this interaction derived principally from the effect of the mother sets upon the high premorbid score group. This group made the most guess errors on the mother contents relative to the other tertile score groups, with the differences being significant at better than the .001 level. Figure 7 illustrates that both mother sets contributed to the group differences. Although the high premorbid group also made the most errors on combined-father sets, differences between the groups were in no case significant. Actually, on the Negative Father set, there was a gradual increase in number of incorrect hypotheses from the low to the high tertile score groups, whereas on the Positive Father set, the low score group was somewhat inferior in performance to the other Ss.

Within-group comparisons further highlight the differential impact of the mother contents upon the high premorbid score group. For these Ss only, a significantly greater number of errors occurred on the mother relative to the father figures, at $p < .01$. Again, this difference was a function of both of the mother sets, although it was more pronounced in the case of the Positive Mother. Patients in the intermediate score group showed only minimal and non-significant differences among the

Table 19

A Comparison of Schizophrenic *Ss* Divided into Tertiles According to Premorbid Scores

Comparison variable	Premorbid Score Tertile Group		
	Low	Intermediate	High
Phillips Scale ratings:			
Mean	8.27	15.40	23.55
Range	3-11	11-21	21-26
Mean WAIS vocab. scores	11.36	10.70	11.27
N	11	10	11

Table 20

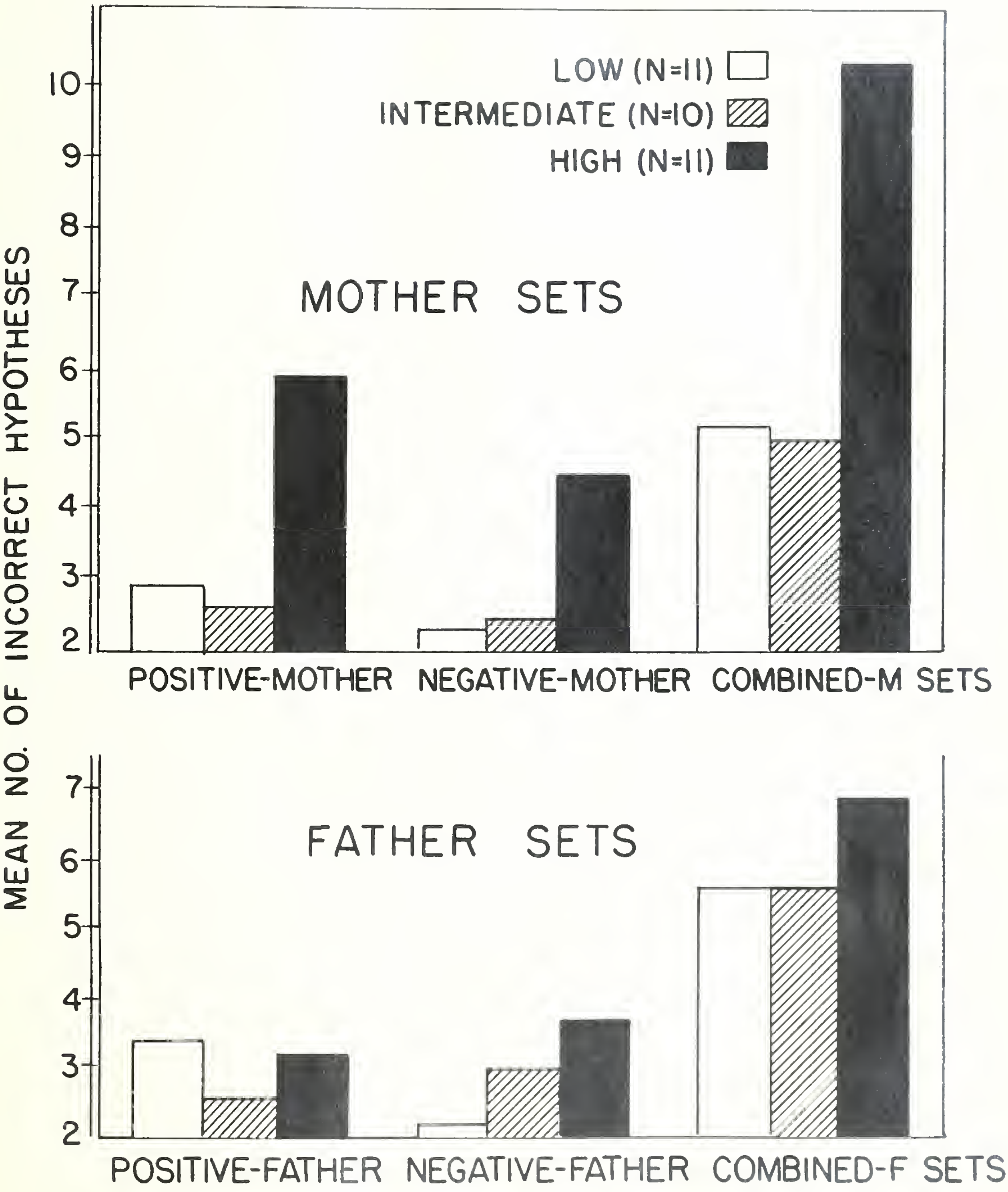
Analysis of Variance of Number of Incorrect Hypotheses for Parental Content Combinations and Premorbid Score Tertile Groups

Source	*df*	Mean square	*F*	*P*
Between *Ss*	31			
Groups (G)	2	78.7779	2.14	<.20
error (b)	29	36.7373		
Within *Ss*	32			
Parent Contents (P)	1	12.2500	--	--
P x G	2	27.9568	3.34	<.05
error (w)	29	8.3737		
Total	63			

Figure 7

Mean number of incorrect hypotheses on mother and father sets for low, intermediate, and high premorbid score groups.

(Groups include only GPM and PPM Ss, divided into tertiles according to their ratings on the Phillips Scale of Premorbid Adjustment.)


LOW (N=11)
INTERMEDIATE (N=10)
HIGH (N=11)
MOTHER SETS
MEAN NO. OF INCORRECT HYPOTHESES
10
9
8
7
6
5
4
3
2
POSITIVE-MOTHER
NEGATIVE-MOTHER
COMBINED-M SETS
FATHER SETS
7
6
5
4
3
2
POSITIVE-FATHER
NEGATIVE-FATHER
COMBINED-F SETS

parent sets. In the low score group, the greatest number of errors were elicited by the Positive Father set, and the next greatest, by the Positive Mother. These differences were naturally masked in comparing combined-mother with combined-father sets.

On the whole, then, the middle range score group did not occupy an intermediate position between low-score GPM and high-score PPM Ss. On the mother sets, in particular, the low and middle tertile score groups were quite comparable in performance, in marked contrast to the high score group.

Type of Incorrect Hypothesis

As was noted in the discussion on scoring in the previous chapter, incorrect hypotheses could be classified into four error types corresponding to the reasons underlying their inappropriateness: Negative, Positive, Repetitive, and Idiosyncratic. Because a single hypothesis might be incorrect on more than one account, for purposes of analysis, a classification hierarchy was set up (see Table 21) to insure that no response would fall into more than one scoring category. Raw scores for each S may be found in Appendix I. An analysis of variance, summarized in Table 22, indicated that type of incorrect hypothesis was a highly significant source of variation. Moreover, in frequency of occurrence, each type was significantly differentiated from every other one at better than the .005 level, as shown in Appendix J, Table 4.

Table 21

Criteria for Classifying Incorrect Hypotheses into Four Mutually Exclusive Category Types

Type	Criteria for classification
1. Idiosyncratic	All hypotheses incorrect because of failure to correspond with potentially relevant concepts--regardless of other sources of error.
2. Repetitive	Of remaining incorrect hypotheses, those repeated after already having been rejected as incorrect.
3. Positive	Of remaining incorrect hypotheses, those failing to characterize *all* the positive instances, as required by the rule.
4. Negative	Of remaining incorrect hypotheses, those which characterize one or more negative instances, in violation of the rule.

Note.--Classification schema forms a hierarchy; only those not falling into a preceding category are considered in subsequent ones.

Table 22

Analysis of Variance of Number of Incorrect Hypotheses According to Type of Error (X + 1 Transformation[a])

Source	*df*	Mean square	*F*	*P*
Between *Ss*	63			
Groups (G)	3	2.6939	2.67	.10
error (b)	60	1.0079		
Within *Ss*	192			
Error Types (E)	3	22.0589	52.15	.0005
E x G	9	.5658	--	--
error (w)	180	.4230		
Total	255			

[a] As recommended by Snedecor (1956).

The error most commonly committed was the Negative type, which occurred as a result of failure to take into account information conveyed by the negative instances of a concept. Second in frequency of occurrence was the Repetitive type, involving faulty recall of the S's own previous responses. Third, was the Positive error, while the least frequent type was the Idiosyncratic. The more frequent occurrence of Negative errors relative to Positive ones is in essential agreement with other research findings (Hovland and Weiss, 1953). In the study cited, the investigators found that a concept was less likely to be attained when the information was transmitted through negative rather than positive instances. They suggest that perceptual factors may contribute to this difference. Unlike positive instances which present the correct combination of features to direct view, negatives instances are really examples of what the concept "is not." The positive instances, therefore, serve to reduce the number of hypotheses which must be entertained whereas the negative ones serve to indicate which alternatives should be discarded.

Although the interaction between frequency of error types and diagnostic groups was not significant (see Table 22), the data could alternatively be approached in terms of the number of Ss within each group who contributed to the pool of errors. Chi-square tests were applied to the number of Ss in each category who made at least one of a particular type error vs. the number who made none of the type under consideration. As shown in Table 23, no significant differences in the frequency distribution of Ss were found for Negative, Positive, and Repetitive type errors. In

Table 23

Frequency Distribution of Ss in Each Diagnostic Group on Each Type of Incorrect Hypothesis

Group (N = 16 per group)	Type of Incorrect Hypothesis				
	Negative	Positive	Repetitive	Successively repetitive	Idiosyncratic
Normal	15	10	13	5	1
GPM	16	10	13	13	8
PPM	16	11	12	10	5
D-PPM	15	14	14	12	7
All groups combined	62	45	52	40	21
X^2	2.06	3.22	.62	10.14	8.15
P	n. s.	n. s.	n. s.	.025	.05

Note.--df = 3; n. s. at P = .25.

fact, with but two exceptions, virtually all Ss made at least one Negative error. On the other hand, on Successively Repetitive errors, i.e., the same hypothesis advanced on consecutive trials, the distribution was significant at the .025 level. Schizophrenic patients, in general, were more prone to commit this type of error than were normal Ss. If the Successively Repetitive error is viewed as possibly reflecting perseverative tendencies, the observed difference is consistent with the pathological symptom picture often postulated for schizophrenia.

Numbers of Ss within each group were also differentially distributed with respect to Idiosyncratic type errors, at $p < .05$ (see Table 23). Over one-third of all the schizophrenic patients offered at least one such hypothesis whereas its occurrence within the normal group was highly atypical, i.e., given by only one S. Most of these Idiosyncratic errors involved the advancement of descriptive features which did not vary within the set and hence did not constitute part of the repertory of potential concepts, e.g., "man with necktie." In a sense, these hypotheses represented overgeneralizations, appropriate to the stimulus characteristics, which were offered as attempts to reconcile apparent opposites, as for example, the presence of both white and black ties among the positive instances. The exceedingly rare occurrence of patently inappropriate responses, e.g., "his shirt is cleaner," may be partly a function of subject selection criteria. The schizophrenic Ss came from a relatively acute population, i.e., initial hospitalization had occurred within the past two

years. Moreover, they had to attain appropriate concepts on the Sample set, which called for some ability to generalize. If a S's verbal responses were too bizarre to be included in a scoring category, he could not be used.

Average Time per Set Spent in Task Solution

No maximum time limits were imposed for successful completion of the task, and Ss were informed that speed would not be a factor in evaluating performance. However, rough estimates were kept of the time spent on each experimental set (including the simple as well as the complex concepts), and these data were available in all but four cases. Table 24 summarizes the results of an analysis of variance of the average number of minutes devoted to each set for Test Sessions and Diagnostic Groups. As in the case of incorrect hypotheses, Test Sessions proved to be a highly significant source of variation. In the initial session significantly more time was spent in arriving at concepts than in the subsequent session (means of 20.71 vs. 14.46 minutes per set, respectively).

Diagnostic Groups also served as a significant source of variance, as noted in Table 24. Results of t tests, reported in Table 25, indicate that the relative ordering of subject groups on the time index is consistent with previous findings. Normal Ss completed the task significantly more rapidly than did either PPM or GPM Ss, while the latter group again occupied an intermediate position.

Also examined through t tests (see Table 26) was the interaction trend between Test Sessions and Diagnostic Groups, noted in Table 24.

Table 24

Analysis of Variance of Minutes per Set, According to Test Session

Source	*df*	Mean square	*F*	*P*
Between *Ss*	59			
Groups (G)	3	386.6257	5.74	<.005
error (b)	56	67.3951		
Within *Ss*	60			
Test Sessions (T)	1	1,171.2500	58.13	<.0005
T x G	3	53.9218	2.68	<.10
error (w)	56	20.1504		
Total	119			

Table 25

Comparisons between Mean Numbers of Minutes per Set for Each Diagnostic Group

Group	*N*[a]	Mean
Normal	32	12.85
GPM	28	17.61
PPM	28	21.21
D-PPM	32	19.12

Between-group comparisons	*t*	*P*[b]
Normal vs. GPM	2.245	.05
Normal vs. PPM	3.943	.001
Normal vs. D-PPM	3.059	.005
GPM vs. PPM	1.644	.20
GPM vs. D-PPM	---	n. s.
PPM vs. D-PPM	---	n. s.

Note:--*df* = 56; n. s. at *P* = .20.

[a] *N* = *S*s per group x 2 sessions.

[b] Two-tailed test.

Table 26

Comparisons between Mean Numbers of Minutes per Set for Each Diagnostic Group in Each Session

		Means in each session	
Group	*N*	First	Second
Normal	16	14.63	11.08
GPM	14	22.11	13.11
PPM	14	25.39	17.03
D-PPM	16	21.47	16.77

Comparisons	*t*	*p*[a]
Between Groups		
In the First Session:		
Normal vs. GPM	4.554	.001
Normal vs. PPM	6.555	.001
Normal vs. D-PPM	4.312	.001
GPM vs. PPM	1.937	.10
GPM vs. D-PPM	--	n. s.
PPM vs. D-PPM	2.389	.025
In the Second Session:		
Normal vs. GPM	--	n. s.
Normal vs. PPM	3.620	.001
Normal vs. D-PPM	3.584	.001
GPM vs. PPM	2.307	.025
GPM vs. D-PPM	2.225	.05
PPM vs. D-PPM	--	n. s.
Within Groups		
First vs. Second Session:		
Normal group	2.233	.05
GPM group	5.300	.001
PPM group	4.930	.001
D-PPM group	2.961	.005

Note. -- *df* = 56; n. s. at *p* = .20.

[a] Two-tailed test.

In the first session, the normal Ss solved the task in significantly less time than did either patient group. GPM Ss, in turn, were more rapid than PPM Ss at the .10 level of confidence. All groups showed a significant decrease in solution time on the second day, with the GPM Ss demonstrating the greatest amount of change. In this session, in fact, they were no longer significantly differentiated from the normal Ss; both groups now arrived at the concepts in less time than the PPM Ss at better than the .025 level.

Other Indices of Conceptual Performance

The S's choice of picture (in contradistinction to his verbal response) was analyzed in terms of its being non-informative, or redundant. In the former case, its placement by the Examiner on the positive or negative side of the test board could furnish no possible information about the concept being sought; in the latter case, its placement could impart no new information. For non-informative choices, the triple interaction among Diagnostic Groups x Contents x Sequences of Presentation was significant at the .10 level, as reported in Appendix J, Table 5. For redundant choices, Contents was significant at $p < .025$ (see Appendix J, Tables 6 and 7). These results, however, did not lend themselves to meaningful interpretations.

Also considered were two qualitative aspects of the Ss' verbal responses, which were independent of the correctness of the hypothesis offered. One of these aspects involved reference to the parent-child

interaction in non-interpersonal terms, e.g., "glass in hand," and the other involved a description of the parental figures in non-familial terms, e.g., "the woman." The chi-square distribution of the number of Ss in each group responsible for these qualitative verbal features revealed no difference that could not be readily attributed to chance (see Appendix J, Table 8).

A Comparison of the D-PPM and PPM Schizophrenic Patient Groups

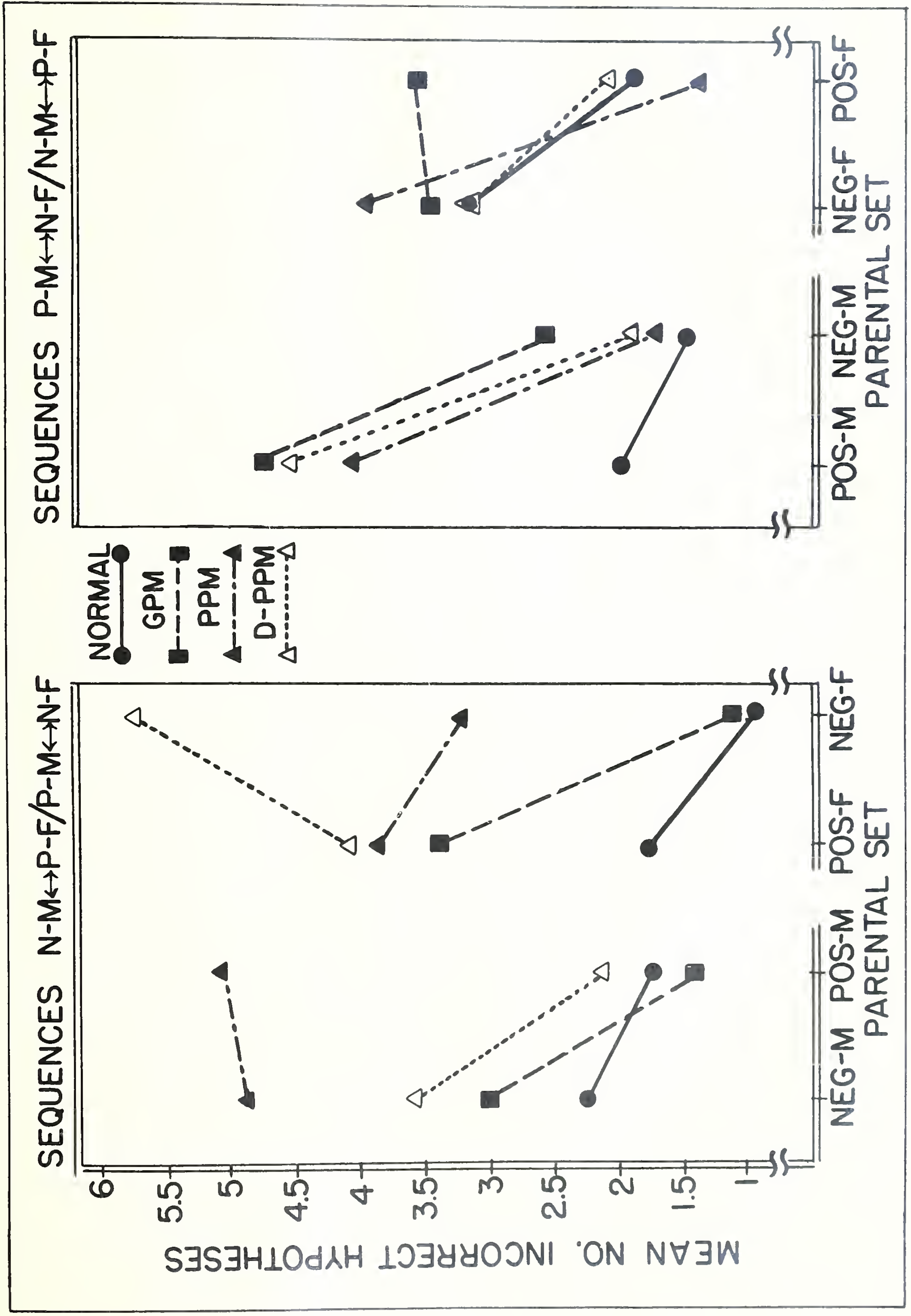
There were no significant differences between D-PPM and PPM Ss on overall number of incorrect hypotheses (Table 7), ordinal position effects (Tables 11 and 12), or types of incorrect hypotheses (Table 23). On the time index, however, the two groups were significantly differentiated during the first session, in which the patients under drug therapy solved the task more rapidly (see Table 26). The PPM group, on the other hand, showed a greater decrease in solution time from the first to the second session, and differences between the groups were no longer significant on the second day.

The similarity between the groups on overall number of incorrect hypotheses actually masks quite dramatic differences on specific parental contents. These differences, which are illustrated in Fig. 8, emerged only when the research population had been subdivided according to the test session in which particular parental combinations were administered. On Sequences N-M⇔P-F/P-M⇔N-F, as indicated in Table 17, the

Figure 8

Mean number of incorrect hypotheses on mother and father sets for normal, GPM, PPM, and D-PPM subject groups according to test sequences.

(Each mean represents scores for 8 *Ss*. Lines between points connect means on the first session with those on the second.)


SEQUENCES N-M↔P-F/P-M↔N-F
SEQUENCES P-M↔N-F/N-M↔P-F
NORMAL
GPM
PPM
D-PPM
MEAN NO. INCORRECT HYPOTHESES
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
NEG-M
POS-M
PARENTAL SET
POS-F
NEG-F
PARENTAL SET
POS-M
NEG-M
PARENTAL SET
NEG-F
POS-F

D-PPM Ss performed somewhat more adequately on the Negative Mother set than did the PPM Ss, but not significantly so. The difference between the two groups, however, was significant at $p < .01$ on the subsequent Positive Mother set. On these pictures, the drug group exhibited the usual improvement associated with sets given in Session II, whereas the PPM Ss showed some decline in adequacy of performance. These findings suggest that the tranquilizing drugs may have had the effect of attenuating the impact of the mother stimuli, an explanation which is congruent with the drugs' supposed anxiety-reducing properties. This interpretation is not supported, however, by the quite unexpected difference between groups which occurred on the Negative Father set, in the second session. Not only did the D-PPM Ss fail to improve on this set, but they became sufficiently impaired in performance as to exceed the number of errors made by PPM Ss, at the .025 level of confidence. This occurrence cannot be satisfactorily explained without becoming unduly speculative.

Chapter V

DISCUSSION

A major objective of the present investigation was the comparison of poor and good premorbid schizophrenics on concept-attainment behavior, as a function of parent-child themas. It was anticipated that censuring mother pictures would have the greatest adverse effect upon the PPM group, and similarly, censuring father pictures, upon the GPM group. Contrary to expectation, it was on the positively toned sets of the significant parent figures that the greatest number of incorrect hypotheses were given. This finding reflects, to a large extent, the failure of PPM Ss to improve on the Positive Mother in the second session and of GPM Ss to improve on the corresponding father set, in contrast to a definite improvement from the first to the second session on all other sets (see Fig. 6). It may be recalled that the positive sets on the second day had been preceded by their negative counterparts in the previous session.

It is possible, therefore, that failure to improve on the positive sets resulted from interferences in task adaptation evoked by the Negative Mother and Negative Father pictures for PPM and GPM Ss, respectively.

To understand how the negative set of the significant parent figure may have interfered with improvement, it may be helpful to consider some of the aspects of learning involved in the task. Probably one factor contributing to more adequate performance was the development of a concept-attainment strategy, i.e., a principle for selecting pictures that would provide the maximum amount of information. Such a strategy would be applicable to all sets, irrespective of content, as for example, always selecting as the first picture one which differs from the Exemplar in just one respect. As illustrated in Appendix H, the most efficient strategy would permit any solution to be reached within two hypotheses. On the parental stimuli, the improved performance in the second session may well have been due, to a significant extent, to the development of an awareness of which features of the picture sets to attend to, and conversely, which to ignore. For example, the facial expressions themselves never varied within a particular set, and in a sense, served only as noise or distraction in arriving at a solution. It is conceivable, then, that once a S had evolved a principle for choosing pictures and had learned which aspects of the stimuli to consider, the task could be solved quite rapidly and in an almost routine manner. It is quite possible that in most instances, the affective aspects of the parent sets were appropriately

ignored in the second session. If, however, the negative set of the significant parent had been given initially, it may have interfered with the development of a task set to disregard facial expression. On the subsequent positive counterpart, therefore, improvement would be less likely to occur. Since the failure to improve pertains primarily to the parent set of the same sex, this interpretation assumes a high degree of "generalization" between positive and negative sets of a particular parent. Frequent unsolicited comments by _S_s are consistent with this assumption; upon presentation of a mother or father set on the second day, it was not unusual for _S_s to remark that they had been given that same parent set on the previous occasion. Incidentally, the inference that certain negative sets in the first session may have led to subsequent deficits on positively toned stimuli is in accord with Rodnick and Garmezy's observations (1957). They report that when a stress condition precedes its nonstress counterpart, "the experimental procedures tend to be invested with potent aversive properties."

If the interpretation is valid that the Negative Mother adversely influenced the performance of PPM _S_s, and the Negative Father, that of GPM _S_s, the main findings of the study can be considered as evidence that: 1) criticizing or rejecting behavior by the parent (or another person) may be a relevant cue for inducing deficit behavior in schizophrenics; 2) the two groups of schizophrenic patients are differentially sensitive to the sex of the censuring person; and 3) this differential sensitivity to mother and father cues appears to be a function of the

adequacy of the patient's premorbid level of adjustment, which, in turn, may be related to differences in the patterning of parent-child role relationships during early periods of personality development. It may be recalled that presumably the family environment of PPM Ss is more likely to be characterized by mother-dominance, in contrast to that of GPM Ss, where father-dominance is more typical (Farina, 1958; Rodnick and Garmezy, 1957).

The findings of this investigation thus offer additional support for a relationship between differences in parental roles and such interrelated factors in the schizophrenic sons as adequacy of premorbid adjustment, reaction to stress during the illness, and prognostic potential. In attempting to relate the differences in parental behaviors to those in the patients, Farina (1958) has discussed, in detail, the process of identification. He suggests that identification with the father is more readily achieved in the familial setting in which the father exercises a dominant and assertive role, as, supposedly, is the case in GPM families. It is this identification with the paternal figure that may underlie the GPM S's greater adequacy in masculine role-taking behavior, relative to that of the PPM S. This greater adequacy is implied by the GPM S's more favorable rating on the Phillips scale, which is based on evidence of some interest and initiative in social and sexual areas of functioning.

It has been argued that unimproved performance in the second session on Positive Mother and Positive Father sets for PPM and GPM

Ss, respectively, occurred as a function of prior contact with the corresponding negative sets. On the basis of the data, the alternative possibility cannot be entirely dismissed that the positive sets themselves may have had a deleterious influence upon performance. If this were the case, it would be the apparently nurturant mother (or father), rather than the overtly censuring one, which had the greater adverse effect upon test behavior. This is a plausible, if not very convincing conjecture in view of the reminder that the mother's "'loving behavior' does not necessarily imply 'affection,'" but on the contrary may serve as "a comment on (since it is compensatory for) her hostile behavior" (Bateson, Jackson, Haley and Weakland, 1956). Tietze (1949), too, has emphasized the especially perversive effects of "subtle domination under the disguise of maternal love." This view is, of course, not inconsistent with the hypothesis of the mother as the more significant figure for the PPM group and of the father for the GPM group. It would, however, be difficult to reconcile this interpretation with the findings of greater deficit usually being associated with censure rather than with reward conditions (Alvarez, 1957; Bleke, 1953; Garmezy, 1952; Zahn, 1956). Of the alternative explanations, therefore, the former would appear to be the more tenable one.

Good and poor premorbid schizophrenic patients have not previously been compared on a task involving some aspect of conceptual functioning. A secondary objective of the investigation, therefore, was to make such a comparison, on a task which required that Ss be able to

abstract similar features among diverse pictures. It might be expected that the GPM group would be more adequate than the PPM group in overall performance on such a task in view of the possible positive relationship between prognostic potential and adequacy of conceptual behavior (see Chapter I). Moreover, on other tasks which have included stress conditions, it has been a recurrent observation that the GPM _S_s occupy an intermediate position between normal control and PPM _S_s. The same relative ordering among groups was found in the present experiment. In summing over contents, the normal group performed significantly better than the PPM group whereas the GPM group fell into an intermediate and non-significant position (see Table 7). It would thus appear that the differences between PPM and GPM schizophrenic _S_s, noted on tasks involving learning (Bleke, 1953; 1955), perceptual discrimination (Rodnick and Garmezy, 1957), size estimation (Harris, 1955; 1957), memory (Mallet, 1956), and shifts in preference (Alvarez, 1957), may be appropriately extended to include concept-attainment behavior. It should be emphasized, however, that there was only a mild tendency for the GPM group, as a whole, to perform more adequately than the PPM group when content scores were averaged (e.g., see Fig. 5). The difference in favor of the GPM _S_s became especially enhanced on mother pictures but was reversed on the Positive Father set. It is possible, therefore, that overall differences between the two patient groups were attenuated by the inclusion of stimuli with cue relevance for the GPM _S_s.

Still another objective of the investigation was the evaluation of the concept-attainment technique, as adapted for use with schizophrenic patients. If the technique proved to be sensitive to disturbances in thinking evoked by cue-relevant parental stimuli, it might serve as a useful method for assessing the effects upon performance of other potentially significant variables. Several considerations led to the adaptation of a concept-attainment test as the method of choice. Of considerable importance was the opportunity it afforded to manipulate content while holding constant the apparent difficulty and complexity of the task. Presumably, differences in the number and perhaps, quality of errors from one set of pictures to another might be largely attributable to the contents, per se. That variations in content might affect performance on the task had been suggested by Bruner et al. (1956). In a far more complex version of the test, they noted that meaningful contents (as contrasted with abstract geometric figures) were apt to arouse thematic imagery which might serve to override a S's rational approach to the task. If this effect was true for their Ss (Harvard undergraduates), it might be expected, all the more, to hold for disturbed schizophrenic patients. Of course, the fact that a modified version of the test could be successfully administered to such patients was another important consideration in its favor. Since participation in the task involved motoric as well as verbal responses, it was found, in preliminary pilot studies, that withdrawn and even hallucinated subjects could be kept in the situation. Finally, not only was the test feasible for use with disturbed schizophrenics

but it was also applicable to a wide range of intelligence levels, i.e., from dull normal, upwards.

The above-noted advantages of the concept-attainment test, as adapted for use in the experiment, were unfortunately offset by certain limitations. Perhaps due to the improvement between sessions, Contents did not interact with Diagnostic Groups in the simple manner that had been expected. This degree of inter-session improvement had not been foreseen in preliminary studies, and was not adequately controlled for in the counterbalancing of sequences. Related to the *S*'s proneness to improvement as a function of task repetition may have been his approach to near-perfect performance, i.e., zero number of errors, once he had "caught on" to the method. The sensitivity of the score range would obviously be decreased if the task became too easy with increased familiarity. For assessing the effects of motivational variables upon performance, the ideal task should be one of intermediate difficulty, as Webb (1952) has recommended.

The very nature of the task itself may have led to a bias in the selection of *S*s. In order to be included in the research sample, *S*s had to demonstrate some ability to arrive at scorable concepts on the Sample set. This requirement involved two related aspects of behavior which could perhaps be observed only in more intact schizophrenic patients-- effective "generalization," and verbal communication of the appropriate concept. It has been a frequent observation that schizophrenic

errors in conceptualization are apt to be ones of either overinclusion or of severe constriction and concretization (e.g., Zaslow, 1950). Subjects who might ordinarily make the latter type of error were unable to participate in the investigation. One such S, for example, refused even to concede that any of the pictures might be alike unless he were allowed to measure them with a ruler. It may be that Ss who are unduly constricted in conceptual functioning are more prone, in general, to react to stressful situations by withdrawal and avoidance. The exclusion of such Ss from the research population could, accordingly, have resulted in the use of a more intact group than had originally been intended. The requirement of appropriate verbal communication especially seems to have had this effect. Those Ss whose responses were the most eccentrically toned (and, hence, most typically schizophrenic) were the ones most apt to be disqualified.

A sampling bias in the direction of more intact patients could well have attenuated differentiating effects of themas by eliminating the Ss most likely to be affected by thematic materials. An example of some of the responses given by a PPM S, who had to be disqualified because of inability to arrive at an appropriate concept, illustrates this possibility: "She has a smile--he don't enjoy taking the milk; knee is bent a little and mother's dress is folded at the arms; he's getting ready to get a glass of milk--he's refusing it." Actually, responses of this type on the experimental pictures were highly atypical since, perhaps, Ss who might have been expected to give them had already been eliminated on the Sample set.

It is apparent that the concept-attainment technique was essentially adapted to take into account effects of thematic materials upon formal, rather than contentual aspects of conceptual behavior. It was possible, nevertheless, to analyze an incorrect hypothesis according to the reason underlying its inappropriateness, e.g., failure to use the information conveyed by the positive instance of a concept. Some measure of the test's sensitivity to schizophrenic thought disturbance was suggested by the analysis of error types. For each of the types considered, the normal control group made the fewest number of errors relative to the patient groups. Furthermore, a smaller proportion of normal Ss were apt to offer an Idiosyncratic or a Successively Repetitive type of incorrect hypothesis. That the former type was largely comprised of errors of over-generalization was probably due to the sampling bias noted above. The Successively Repetitive type of error could perhaps reflect perseveration, an aspect of behavior frequently ascribed to schizophrenic patients.

A further limitation of the test method should be noted. The use of an important affective attribute, i.e., facial expression, as distraction may have reduced the potency of content effects. To be successful in arriving at a concept, the S had to ignore, or in a sense, avoid this interfering attribute. Since this behavior may correspond with the schizophrenic's own propensity toward avoidance in the face of threat, the impact of the affective feature would be less likely to show up in the S's performance.

The Effects of Ataractic Drug Therapy

Patients receiving ataractic drug therapy were included in the research population primarily for comparison with the PPM patient group. The latter group was expected to show deficits in performance on mother-related stimuli as a result of the pictures' presumed anxiety-arousing potential. If, therefore, the patient's anxiety were reduced through medication, a comparable reduction in his deficit behavior might well be anticipated. In support of this expectation are the findings of both Alvarez (1957) and Zahn (1956) which indicate that schizophrenic patients under tranquilizing drug therapy are less sensitive to censured stimuli, in general, than are drug-free schizophrenics.

A major finding for the PPM Ss was their failure to improve on the Positive Mother set when presented in the second session. The D-PPM Ss, on the other hand, showed an improvement on this set and, in fact, were comparable in performance to both the GPM and normal control Ss. It would thus appear that the tranquilizing drugs did have the effect of attenuating the impact of the mother stimuli. This would be in support of an hypothesis that the mother is a cue for anxiety in PPM Ss since improved performance occurred when anxiety was reduced through medication. However, the failure of D-PPM Ss to improve on the Negative Father set on the second day is inconsistent with this interpretation; in fact, on this set, these Ss showed a noticeable increase in errors (see Fig. 8). If deficits in performance are mediated by anxiety,

and drugs attenuate anxiety, these inconsistent findings are difficult to explain. Certainly if the impaired performance on the father pictures should result from some artifact in sampling variability, it would be tenuous to ascribe the improvement on the mother set, shown by the same Ss, to ameliorating effects of medication.

Only one other notable difference between PPM and D-PPM Ss was observed. In the first session, the Ss under drug therapy spent significantly less time than the drug-free PPM Ss in the attainment of concepts (see Table 26). Since the two groups were comparable in their overall number of errors on the first day, it may be that the tranquilizing medication enabled Ss to function initially in a stressful situation with somewhat less temerity and greater decisiveness, if not with greater accuracy. Perhaps these Ss were less concerned and hence, less ruminative about their selection of pictures. It might be inferred from this observation that for Ss who are retarded, blocked, or fearful, ataractic drug therapy may be effective in facilitating their functioning in an interpersonal situation. On the other hand, the role of drugs may be less important in a more familiar social context, since in the second session the two poor premorbid patient groups were no longer differentiated on the time index.

The general absence of consistent differences between the PPM and D-PPM groups may be attributed to several factors. It is possible that the task itself, involving some aspects of thinking, was not very potent in picking up effects of drugs. Whereas ataractic medication is

effective in reducing both overt manifestations and subjective reports of anxiety (Anton-Stephens, 1954; Fromm and Forsberg, 1956; Pennington, 1957; Winkelman, 1954; Winkelman, 1957), psychotic ideation may be more resistant to modification (Zeller, Graffagnine, Cullen, and Reitman, 1956). Insofar as a conceptual task entails ideational behavior, therefore, inter-group differences may have been minimized. Some support for this inference is suggested by the comparability between the PPM and D-PPM Ss on the error types found to be especially characteristic of the schizophrenic patient groups. Apparently the "schizophrenicity" of the responses was not significantly affected by the drugs.

Another factor which may have tended to minimize differences in performance between the two poor premorbid groups is the possible overlap between the groups on the drug variable. Several of the non-drug patients had been off medication for periods as short as four days. It has been assumed that tranquilizing agents (chlorpromazine, in particular) are so rapidly excreted that drug-relieved symptoms may recur within 24 to 48 hours after the drug has been discontinued (Bernheim[1]; Winkelman, 1957; Zeller et al., 1956). However, Margolis (1957) notes that not all pharmacologists are in agreement with regard to indefinite maintenance therapy for continued beneficial effects. It is conceivable,

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[1] F. Bernheim, Personal communication, 1959.

therefore, that some of the non-drug patients may have still been under the ameliorating influence of former medication.

On the other hand, not all the Ss in the drug sample were necessarily receiving medication that was equally active as an ataractic agent. The drug group was very heterogenous with respect to both type of agent and dosage (see Appendix B, Part 6). Half of the Ss were being treated with chlorpromazine (i.e., "thorazine") while the others were on a variety of other tranquilizers, some of which may have had only minimal effects upon psychological functioning. That various types of drugs may have differential effects upon performance was especially suggested by Zahn (1956), who found greater changes in performance on a size estimation task for Ss under chlorpromazine than for those receiving reserpine. It is possible that the drugs themselves have quite different effects upon behavior, or that there is a selective factor in the assignment of Ss to a certain ataractic agent, or both. For example, "compazine," which is a milder form of medication usually recommended for out-patient treatment (Vischer, 1957), may have been reserved for the schizophrenic Ss who were showing fewer signs of disturbance to begin with. Unfortunately, in the present experiment, comparisons of content effects upon particular drugs were not feasible because the chlorpromazine condition was not evenly distributed among the sequences.

In evaluating the influence of any particular tranquilizer, the importance of adequate dosage has been underscored (Anton-Stephens, 1954;

Winkelman, 1954). There is no uniformity, however, in the estimates of what does, in fact, constitute an optimal dosage. For chlorpromazine alone, the recommended daily amount has varied anywhere from 200 to 1,000 mg. (Margolis, 1957), and some investigators believe that the prescribed dosage must be highly individualized from one subject to another (Winkelman, 1957). The mode and frequency of administration, as well as the length of time the S has been under treatment, are other considerations which may be relevant to the efficacy of a particular ataractic agent.

It is obvious that considerable variability in experimental findings may be expected unless the Ss have been limited to one particular type of tranquilizer, and some attempt has been made to control for dosage. Failure to observe these cautions are apt to be more serious in investigations like the present one, where Ns are relatively small, and quite a few other sources of variation have already been introduced.

A Note on the Phillips Scale

The Phillips Scale of Premorbid Adjustment was originally devised as a prognostic indicator which could successfully differentiate improved from unimproved schizophrenic patients (Phillips, 1953). Findings of subsequent studies have generally corroborated the scale's predictive validity. Rodnick and Garmezy (1957) have noted that the average length of hospitalization tends to be shorter for GPM than for PPM schizophrenic patients. Moreover, Farina and Webb (1956) have found that following

discharge, the GPM patients are apt to remain out of the hospital for a longer period of time than are PPM patients.

Differences in hospitalization as a function of premorbid level of adjustment were also indicated in the present investigation. Although all three patient groups had been equated on total elapsed time since initial admission, 56% of the GPM group were currently readmissions to the hospital, as contrasted with only 19% in each of the poor premorbid groups (see Table 27). Consequently, the current duration of hospitalization as well as the total time spent in institutions were shorter for GPM _Ss_ relative to the other patient groups. Since these data suggest that a more rapid remission of psychotic symptomatology may occur in GPM patients, the Phillips Scale is given additional presumptive validity. Moreover, remission of a previous episode has sometimes been interpreted as a favorable prognostic sign for subsequent discharge (e.g., Chase and Siverman, 1943; Clow, 1953).

Table 27

A Comparison of the Patient Groups on Certain Hospitalization Variables

(*N* = 16 *Ss* per group)

	Schizophrenic patient group		
Hospitalization variable	GPM	PPM	D-PPM
Months since first admission:			
Mean	8.17	8.39	9.09
S. D.	10.17	7.51	7.36
Range	.25-37	.75-27.5	.5-23
Total number of hospitalizations:			
Mean	1.56	1.25	1.19
Range	1-2	1-3	1-2
% of *Ss* with > 1 admission	56	19	19
Months since current admission:			
Mean	2.48	5.84	6.53
S. D.	1.82	5.12	6.12
Range	.25-6	.25-19.5	.5-23
Total number of months spent in hospital:			
Mean	3.73	6.50	7.27
S. D.	3.67	5.52	6.10
Range	.25-15	.75-21.5	.5-23

Chapter VI

SUMMARY

The present experiment was designed primarily to compare the performance of poor and good premorbid male schizophrenics on a conceptual task involving both nurturant and censuring parent-child relationships. On the basis of presumed differences in actual parent-child interactions for these two groups of schizophrenics, it was anticipated that they would be differentially sensitive to the sex of the rejecting or criticizing parent. For poor premorbid schizophrenics, the mother has been identified as the more dominant and hence, presumably, more traumatogenic agent during childhood. On the other hand, for good premorbid schizophrenics, there is some evidence that the father may have been the more dominant parent. It was accordingly expected that the conceptual performance of the poor premorbid patients would be relatively

more adversely affected by stimulus materials portraying a censuring mother-son relationship, whereas good premorbid patients would show relatively more deficit with comparable father-son pictures.

Four independent groups of 16 _Ss_ each, participated in the research. All were males matched on a group basis for age, education, and estimated verbal intelligence. Recently hospitalized drug-free schizophrenic patients were classified as good premorbid (GPM) or poor premorbid (PPM) in accordance with ratings on the Phillips Scale of Premorbid Adjustment, which is based on case history data. An additional group of poor premorbid schizophrenics, under some form of ataractic drug therapy (D-PPM), was also included. Finally, a fourth group of normal control _Ss_, representing a wide range of occupational pursuits, was recruited in order to provide some baseline for comparison with the patient groups.

In order to assess the influence of parent-child themas upon conceptual functioning, a modification of the Bruner concept-attainment technique was devised. A Sample set of 16 pictures, involving two geometric figures, was used to orient the _Ss_ to the task and to eliminate those unable to cooperate in the experiment. In addition, five independent sets of 16 pictures each were individually administered to every _S_, in two sessions, with the sequences of presentation counterbalanced among the various _Ss_. Comprising the experimental series were: 1) a _Neutral_ set which consisted of two non-human figures; 2) a _Positive_ _Mother_ set

which portrayed a positively toned, nurturant mother-son relationship; 3) a Negative Mother set which presented a negatively toned, censuring mother-son interaction; and 4) Positive Father, and 5) Negative Father sets, which were comparable in composition and affective tone to the corresponding mother sets. Within either test session, the two parental sets administered differed with respect to both sex of parent and affective tone of the interaction.

It was found that, in general, a marked improvement occurred in conceptual performance from the first to the second session. The only exceptions among drug-free patient and normal groups were the failure of the PPM group to improve on the Positive Mother set in the second session, and similarly, of the GPM group to improve on the Positive Father. Since the positive sets on the second day had been preceded by their negative counterparts in the previous session, these exceptions were interpreted as resulting from interferences in task adaptation evoked by the Negative Mother and Negative Father sets for the poor and good premorbid groups, respectively.

In overall performance, the normal Ss made significantly fewer errors than did the poor premorbid patients; the good premorbid patients occupied an intermediate, and non-significant position between the other groups. The difference between GPM and PPM groups, in favor of the former Ss, was especially enhanced on the Positive Mother set, but showed a reversal on the Positive Father pictures.

The drug group solved the task significantly more rapidly, although no more accurately, than did the PPM group in the first session. Moreover, in contrast to the PPM Ss, the Ss under drug therapy showed the expected improvement on the Positive Mother set in the second session. While it might thus appear that ataractic medication had the effect of attenuating the impact of the mother pictures, this interpretation was not supported by the increase in errors noted for the drug group on the Negative Father set on the second day.

APPENDIXES

Appendix A

The Phillips Rating Scale of Premorbid Adjustment

A. Recent Sexual Adjustment

1. Stable heterosexual relation and marriage 0

2. Continued heterosexual relation and marriage but unable to establish home 1

3. Continued heterosexual relation and marriage broken by permanent separation 2

4. a) Continued heterosexual relation and marriage but with low sexual drive 3

   b) Continued heterosexual relation with deep emotional meaning but emotionally unable to develop it into marriage 3

5. a) Casual but continued heterosexual relations, i.e., "affairs", but nothing more 4

   b) Homosexual contacts with lack of or chronic failure in heterosexual experiences 4

6. a) Occasional casual heterosexual or homosexual experiences with no deep emotional bond 5

   b) Solitary masturbation with no active attempt at homosexual or heterosexual experiences 5

7. No sexual interest in either men or women 6

B. Social Aspects of Sexual Life During Adolescence and Immediately Beyond

1. Always showed a healthy interest in girls with a steady girl friend during adolescence 0

2. Started taking girls out regularly in adolescence ... 1

3. Always mixed closely with boys and girls 2

Appendix A (continued)

The Phillips Rating Scale of Premorbid Adjustment

4. Consistent deep interest in male attachments with restricted or no interest in girls	3
5. a) Casual male attachments with inadequate attempts at adjustment to going out with girls	4
b) Casual contacts with boys and girls	4
6. a) Casual contacts with boys and with lack of interest in girls	5
b) Occasional contacts with girls	5
7. No desire to be with boys and girls; never went out with girls	6

C. Social Aspects of Recent Sexual Life: 30 Years of Age and Above

1. Married and has children, living as a family unit	0
2. Married and has children but unable to establish or maintain a family home	1
3. Has been married and had children but permanently separated	2
4. a) Married but considerable marital discord	3
b) Single, but has had engagement or deep heterosexual relationship but emotionally unable to carry it through to marriage	3
5. Single, with short engagements or relationships with women which do not appear to have had much emotional depth for both partners: i.e., "affairs"	4

Appendix A (continued)

The Phillips Rating Scale of Premorbid Adjustment

6. a) Single, has gone out with a few girls but without other indications of a continuous interest in women 5

   b) Single, consistent deep interest in male attachments, no interest in women 5

7. a) Single, occasional male contacts, no interest in women 6

   b) Single, interested in neither men nor women 6

C. (Cont'd) Social Aspects of Recent Sexual Life: Below 30 Years of Age

1. Married, living as family unit, with or without children . 0

2. a) Married, with or without children, but unable to establish or maintain a family home 1

   b) Single but engaged or in a deep heterosexual relationship (presumably leading towards marriage) .. 1

3. Single, has had engagement or deep heterosexual relationship but has emotionally been unable to carry it through to marriage 2

4. Single, consistent deep interest in male attachments, with restricted or lack of interest in women 3

5. Single, casual male relationships with restricted or lack of interest in women 4

6. Single, has gone out with a few girls casually but without other indications of a continuous interest in women .. 5

7. a) Single, never interested in or never associated with either men or women 6

   b) Anti-social 6

Appendix A (continued)

The Phillips Rating Scale of Premorbid Adjustment

D. Personal Relations: History

1. Always has had a number of close friends but did not habitually play a leading role	1
2. a) From adolescence on had a few close friends	3
b) From adolescence on had a few casual friends	3
3. From adolescence on stopped having friends	4
4. a) No intimate friends after childhood	5
b) Casual but never any deep intimate mutual friendships	5
5. Never worried about boys or girls; no desire to be with boys and girls	6

E. Recent Adjustment in Personal Relations

1. Habitually mixed with others, but not a leader	1
2. Mixed only with a close friend or group of friends	3
3. No close friends; very few friends; had friends but never quite accepted by them	4
4. Quiet; aloof; seclusive; preferred to be by self	5
5. Anti-social	6

Appendix B   Personal Characteristics of Individual Ss   1. Normal Control Ss

Subj. no.	Sequence of presentation[a]	Age	Education (years completed)	WAIS vocab. (weighted)	Occupation
N 1.	a-1	21	11	11	service station manager
N 2.	a-1	38	12	13	machinery pattern maker
N 3.	a-2	27	12	9	maintenance man
N 4.	a-2	29	13	14	expediter and draftsman
Mean (N 1-4)		28.75	12.0	11.75	
N 5.	b-1	28	12	11	heating equipment serviceman
N 6.	b-1	31	9	10	truckdriver
N 7.	b-2	18	9	7	factory worker
N 8.	b-2	39	16	15	photographer
Mean (N 5-8)		29.00	11.5	10.75	
N 9.	c-1	34	12	11	machinery adjustor
N 10.	c-1	28	14	11	salesman
N 11.	c-2	33	12	14	firefighter
N 12.	c-2	26	11	10	plant foreman
Mean (N 9-12)		30.25	12.25	11.5	
N 13.	d-1	37	12	11	warehouse manager
N 14.	d-1	27	14	11	mechanical engineer
N 15.	d-2	23	11	10	garage attendant
N 16.	d-2	29	12	10	Air Force staff sergeant
Mean (N13-16)		29.00	12.25	10.5	

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[a] See Table 4 for specific sequence patterns. In all groups, Ss with the same code number were given the same sequences.

(continued)

Appendix B (continued) Personal Characteristics of Individual Ss 2. GPM Schizophrenic Ss

Subj. no.	Age	Education (years completed)	WAIS vocab. (weighted)	Phillips Scale Ratings	Months since 1st admission	Months since current admission[a]
G 1.[b]	32	10	11	11(8-14)	8	1.5
G 2.	38	12	9	9(12)	4	--
G 3.	21	7	7	12(13)	2.5	1.5
G 4.	28	18	14	11(10-12)	1.5	--
Mean (G 1-4)	29.75	11.75	10.25	10.8(9.8-12.8)	4.00	
G 5.	28	9	12	6	2	.5
G 6.	36	20	15	3(11)	22	5.0
G 7.	23	11	8	10(9-13)	4	--
G 8.[b]	32	13	9	9(8)	24	4.0
Mean (G 5-8)	29.75	13.25	11.00	7(6.5-9.8)	13.00	
G 9.	23	13	13	10(9-13)	37	6.0
G 10.	31	11	9	8	4	2.0
G 11.	32	11	10	13(8)	10[c]	1.0
G 12.	25	13	13	12	8	5.0
Mean (G 9-12)	27.75	12.00	11.25	10.8(9.3-11.5)	14.75	
G 13.	33	10	10	11(12)	2.00	--
G 14.	28	15	16	7(6-8)	.75	--
G 15.	22	9	10	9(7-10)	.25	--
G 16.	37	10	10	9(12)	.75	--
Mean (G13-16)	30.00	11.00	11.50	9(8.3-10.5)	.94	

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[a] Only for Ss who are readmissions.

[b] On insulin.

[c] Possible psychotic admission 8 years earlier.

(continued)

Appendix B (continued) Personal Characteristics of Individual Ss 3. PPM Schizophrenic Ss

Subj. no.	Age	Education (years completed)	WAIS vocab. (weighted)	Phillips Scale Ratings	Months since 1st admission	Months since current admission[a]
P 1.	20	12	11	22(20-23)	3	--
P 2.	33	10	10	17(19)	3	--
P 3.	26	12	10	19(17-20)	14	--
P 4.	38	12	14	23(21-24)	.75	--
Mean (P 1-4)	29.25	11.50	11.25	20.3(18.8-21.5)	5.19	
P 5.	32	11	11	26	16	.25[b]
P 6.	22	9	8	26 (24-28)	10	--
P 7.	22	13	16	20(22)	12	--
P 8.	39	12	11	24(23-28)	6	--
Mean (P 5-8)	28.75	11.25	11.50	24(23.3-26)	11.00	
P 9.	33	12	12	22(21-23)	27.5	19.5
P 10.	26	12	12	25(22-26)	3.5	--
P 11.	35	9	12	26(24)	3.0	--
P 12.	27	8	10	21(18-24)	21.0	4.0
Mean (P 9-12)	30.25	10.25	11.50	23.5(21.3-24.8)	13.75	
P 13.	44	14	12	21(20-23)	1.5	--
P 14.	18	12	9	21(19)	3.5	--
P 15.	31	13	11	18(16-22)	4.0	--
P 16.	29	9	11	23(21-25)	5.5	--
Mean (P 13-16)	30.50	12.00	10.75	20.8(19-22.8)	3.63	

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[a] Only for Ss who are readmissions.

[b] Current admission is the patient's third.

(continued)

4. GPM and FPM Schizophrenic Ss

Subj. no.	Diagnostic subtype	Occupation	Subj. no.	Diagnostic subtype	Occupation
G 1	paranoid	odd jobs	P 1	acute undiff.	odd jobs
G 2	paranoid	factory worker	P 2	residual	photographer
G 3	schizo-affective	construction work	P 3	acute undiff.	printing press operator
G 4	schizo-affective	law student	P 4	paranoid	unemployed
G 5	acute undiff.	printer	P 5	paranoid	clerk
G 6	paranoid	M. D.	P 6	chronic undiff.	odd jobs
G 7	schizo-affective	odd jobs	P 7	paranoid	odd jobs
G 8	acute undiff.	store work	P 8	catatonic	unemployed
G 9	schizo-affective	laborer	P 9	paranoid	odd jobs
G 10	paranoid	telephone worker	P 10	chronic undiff.	factory worker
G 11	paranoid	salesman	P 11	schizo-affective	odd jobs
G 12	undifferentiated	equipment installator	P 12	undetermined	construction worker
G 13	paranoid	mill worker	P 13	simple	machinist
G 14	paranoid	meat cutter	P 14	paranoid	student
G 15	acute undiff.	lab. technician	P 15	undifferentiated	bulldozer operator
G 16	paranoid	maintenance man	P 16	chronic undiff.	unemployed

(continued)

Appendix B (continued) Personal Characteristics of Individual Ss 5. D-PPM Schizophrenic Ss

Subj. no.	Age	Education (years completed)	WAIS vocab. (weighted)	Phillips Scale Ratings	Months since 1st admission	Months since current admission[a]
D 1.	26	8	9	20 (22)	5.5	--
D 2.	34	12	11	23 (22-24)	5	--
D 3.	28	12	11	18 (21)	23	--
D 4.	37	16	16	21 (23)	20	3.5
Mean (D 1-4)	31.25	12.00	11.75	20.5 (20.3-22.5)	13.38	
D 5.	34	12	11	21 (17-22)	3[b]	--
D 6.	20	12	10	19 (18-20)	19	3.5
D 7.	31	14	14	20 (23)	13	--
D 8.	32	10	9	24 (22-25)	8	--
Mean (D 5-8)	29.25	12.00	11.00	21 (19.3-22.5)	10.75	
D 9.	24	12	15	25 (22-28)	3	--
D 10.	34	7	8	20 (18-22)	17	--
D 11.	37	16	14	20	14	5
D 12.	28	9	9	27 (26)	1	--
Mean (D 9-12)	30.50	11.25	11.50	23 (21.5-26.3)	8.75	
D 13.	34	12	12	22 (24)	1.0	--
D 14.	22	12	13	25 (21)	.5	--
D 15.	27	8	7	22 (21-25)	2.5	--
D 16.	37	12	12	22 (21-23)	10.0	--
Mean (D 13-16)	30.00	11.00	11.00	22.8 (21.8-23.3)	3.50	

[a] Only for Ss who are readmissions.

[b] Hospitalization 7 years earlier for "conversion reaction".

(continued)

6. D-PPM Schizophrenic *S*s

Subj. no.	Medication	Dosage (in mg.)	Frequency[a]	Diagnostic subtype	Occupation
D 1	thorazine	100	bid	paranoid	odd jobs
D 2	thorazine	150	qid	paranoid	accountant + odd jobs
D 3	thorazine	50	bid	paranoid	unemployed
D 4	thorazine + ritalin	100 + 15	qid + bid	hebephrenic	mechanical engineer
D 5	trilafon	8	tid	none given	odd jobs
D 6	compazine	25	bid	acute undiff.	clerical worker
D 7	meprobamate	400	bid	paranoid	unemployed
D 8	compazine	10	tid	other, mixed	odd jobs
D 9	marsilid	100	tid	simple	odd jobs
D 10	thorazine	?	?	schizo-affective	odd jobs
D 11	equanil	400	qid	schizo-affective	trade journal editor
D 12	thorazine	100	qid	chronic	unemployed
D 13	thorazine	100	qid	chronic undiff.	odd jobs
D 14	compazine	20	tid	catatonic	odd jobs
D 15	thorazine	50	daily	paranoid	prisoner
D 16	compazine	15	bid	paranoid	elevator operator

[a] bid = twice daily; tid = 3 times daily; qid = 4 times daily.

Appendix C

Number of Ss in Each Schizophrenic Patient Group According to Hospitals from Which They Were Recruited

Hospital	Schizophrenic patient group GPM	PPM	D-PPM	All groups combined
Boston State	1	1	1	3
Boston V. A.	3	1	2	6
Brooklyn State	0	1	1	2
Bronx V. A.	1	0	1	2
Butner State, N. C.	0	2	0	2
Connecticut State	0	1	2	3
Gardner State, Mass.	0	1	0	1
Grafton State, Mass.	1	0	0	1
Manhattan State	0	0	2	2
McLean, Mass.	1	1	1	3
Medfield State, Mass.	0	2	1	3
Norwich State, Conn.	2	1	0	3
V. A. Hospital--New York City	0	0	2	2
Westborough State, Mass.	2	4	1	7
Worcester State, Mass.	5	1	2	8

Note.--Facilities were also made available in the East Orange, N. J. and West Haven, Conn. V. A. Hospitals.

Ss used in the pilot studies came from three North Carolina hospitals: Butner State, Dix Hill State, and the Durham V. A.

Appendix D

Number of Ss Omitted from Final Sample According to Reasons for Disqualification

	Schizophrenic patient group				All
Reason	GPM	PPM	D-PPM	Undetermined	groups combined
			All Sets Completed		
Matching considerations, only	1	5	2	0	8[a]
Intermediate Phillips rating	0	0	0	11	11
Treatment considerations	3	1	0	1	5
Non-schizophrenic diagnosis	2	1	1	1	5
Other reasons, e.g., low WAIS vocab.	1	0	1	0	2
Total no. of Ss omitted who completed all sets	7	7	4	13	31
			Sets Not Completed		
Unable to cooperate[b]	1	2	2	5	10
Refusal to complete	1	0	2	1	4
Low WAIS vocab.	0	1	0	2	3
Unable to comprehend nature of task	0	2	0	0	2
Other reasons, e.g., language handicap	1	1	0	0	2
Total no. of Ss omitted who did not complete all sets	3	6	4	8	21

[a] Seven normal control Ss were also eliminated on this basis.

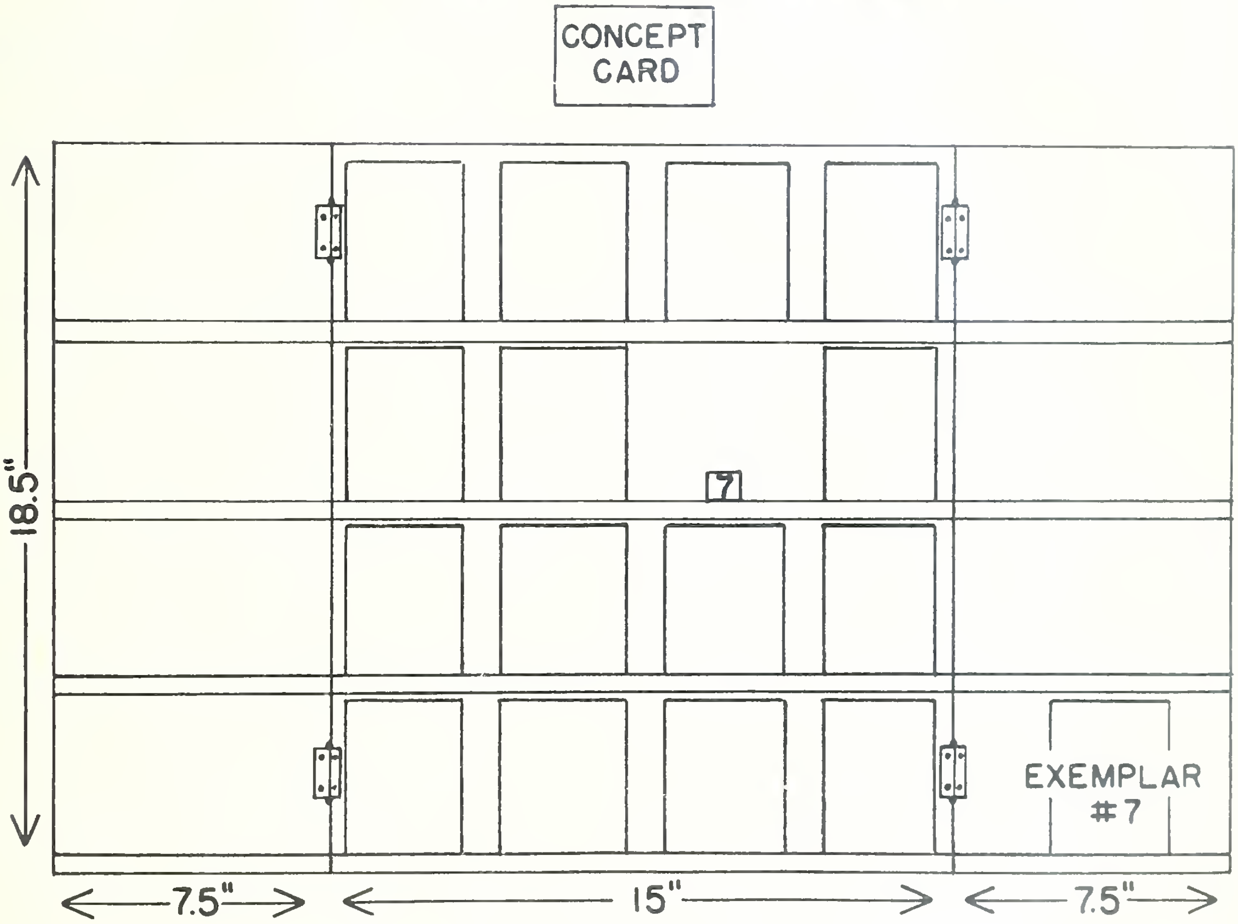
[b] Blocked, confused, preoccupied, agitated, severely deluded, etc.

Appendix E

Diagrammatic Representation of the Test Board.

The board is constructed of masonite and painted gray, with hinged sides so that it may be folded when not in use. Since the board is presented at a slight slope, with the end closest to the Examiner raised about four inches from the surface, metal strips (about 1/2 inch in width) serve to keep the pictures in position.

E SITS ON THIS SIDE FACING *S*



NEGATIVE INSTANCES ARE PLACED TO *S*'s LEFT

ENTIRE SET OF 16 PICTURES IS INITIALLY PRESENTED IN CENTER OF BOARD (NOS. INDICATING POSITION SHOW ONLY AFTER REMOVAL OF PICTURE)

POSITIVE INSTANCES ARE PLACED TO *S*'s RIGHT

S SITS ON THIS SIDE FACING *E*

Appendix F

Instructions Given in the Test Administration

1. Location of Simple Concepts -- For all sets. Always the initial step presented (not scored).

You have in front of you 16 pictures of a (1)________________
They are similar to each other in certain ways although no two are exactly alike.

a- First look at the (2)__________. Notice that (3)______________
or (4)____________________.

Point to all the pictures showing a (5) ____________ (If error, correct
Now point to all those showing a (6) ______________ Otherwise: "Very good")

b- Now look at the (7)__________. Notice that (8)_______________

Point to all the pictures showing a (9) ______________ (Same as
Now point to all those showing a (10) _________________ above)

c- Again, look at the (11)__________. Notice that (12)____________
may be white or black.

Point to all the pictures showing a (13) ________________ (Same as
Now point to all those showing a (14) __________________ above)

d- Finally notice that each picture (15) ___________________
which may be white or black.

Point to all the pictures showing a white (16) ________________
Now point to all those showing a black (17) _____________________

Example: For sample set fill in numbers as follows:

1. a large figure and a small figure; 2. small figure; 3. it may be shaped like a cirice; 4. square; 5. small circle; 6. small square; 7. large figure; 8. it may be shaped like a diamond or triangle; 9. large diamond; 10. large triangle; 11. large figure; 12. it; 13. large white figure; 14. large black figure; 15. has a border around it; 16. border; 17. border.

Note.--Appropriate substitutions for other picture sets can be derived from Table 3.

(continued)

Appendix F (continued)

2. Identification of Simple Concepts -- For Sample Set, only.

Examiner selects an Exemplar plus 2 positive and 2 negative instances.

Now we are ready to start a new game. This picture (Exemplar) belongs with some others in one particular way which is written on the back of this card (Concept Card).

On this side (S's right), I am putting two other pictures (Positive instances) which belong with this one (the Exemplar) in the way written on the card, and on this side (S's left), I am putting two which do not belong in that way (Negative instances).

Look at the pictures on this side (point to S's right) and see if you can guess the answer on the card which tells the way in which these are all alike. The answer will not fit either of the pictures on this side (point to S's left).

Repeat directions as often as necessary.

On later trials: Again, here are some pictures which belong together in one particular way written on the back of this card, and here are two which do not belong in that way. Try to guess the answer which tells how these are alike (point to S's right). The answer must not be true for any of these over here (point to S's left).

When correct: Fine--that is what is written on the back of the card (Uncover).

When incorrect: Point out error and give appropriate explanation as below:

That is true for this one but not for this. You are looking for a way that is true for all of the pictures on this side.

or

That is true, but so does this one over here (S's left). You are looking for a way that is true for all of the pictures on this side, but not for any of those on this side. Try again.

Code	Concept	Exemplar	Positive	Negative
4	large triangle	9	11, 16	1, 4
7	white border	12	1, 2	5, 15
2	small square	7	4, 8	2, 13
6	large black figure	6	8, 14	1, 15

(continued)

Appendix F (continued)

3. Attainment of Simple Concepts (with several aids)--For Sample Set, only. Examiner selects an Exemplar plus 1 positive and 1 negative instance. This time, S must choose additional pictures.

Now we are ready to try a slightly different game. This picture (Exemplar) belongs with some others in one particular way which is written on the back of this card (Concept Card).

On this side (S's right), I am putting one other picture (Positive instance) which belongs with this one (the Exemplar) in the way written on the card, and on this side (S's left), I am putting one which does not belong in that way (Negative instance).

The object of the game is to guess as soon as possible the answer on the card which tells how the pictures go together.

This time you are to choose a picture from the board which you think might belong with these two (point to S's right) in some way that would not fit this picture (point to S's left). If the one you choose does belong in the way written on the card, I will place it on this side (right). If it doesn't happen to fit the answer, I'll put it here (left).

After I tell you where the picture goes, you will have a chance to try to guess the answer. You will have only one guess, but then you may keep on choosing other pictures to help you. Each time I tell you where a picture goes, you will get another guess.

Remember this rule: The answer on the card will always be true for all of the pictures on this side (S's right). It will never fit any of the pictures that go here (S's left).

Don't forget--your object is to guess what is on the card. Sometimes a picture which goes on this side (left) can help you with the answer just as much as one that goes here (right).

Code no.	Concept	Exem. no.	Posit. inst.	Negat. inst.	Immediately feasible
1	small circle	10	6	16	correct only
5	large white fig.	3	15	12	correct only
3	large diamond	5	6	10	correct + bl. border
8	black border	15	7	9	correct + sm. square

(continued)

Appendix F (continued)

4. Attainment of Simple Concepts (with minimal aid) -- For all sets.

Examiner selects only one Exemplar.

This picture (Exemplar) belongs with some others in one particular way which is written on the back of this card (Concept Card). You are to try to guess the answer on the card which tells how the pictures go together.

Start by choosing a picture from the (center of the) board which you think might belong with this one (Exemplar). If the one you choose fits the answer that is on the card, I will place it on this side (S's right). If it doesn't happen to fit the answer, I'll put it here (S's left).

After I tell you where the picture goes, you will have a chance to try to guess the answer. You will have only one guess, but then you may keep on choosing other pictures to help you. Each time I tell you where a picture goes, you will get another guess.

Remember this rule: The answer on the card will always be true for all of the pictures on this side (S's right). It will never fit any of the pictures that go here (S's left).

Don't forget--your object is to guess what is on the card. Sometimes a picture which goes on this side (left) can help you with the answer just as much as one that goes here (right).

Code no.	Concept	Exemplar no.	Positive instances
7 r[a]	white border	9	1-4; 10-12
4 r	large triangle	16	9-15
1 r	small circle	2	1,5,6,9,10,13,14

---

[a] r indicates that same concept was given earlier.

(continued)

Appendix F (continued)

5. Identification of Complex Concepts -- For Sample Set, only.

Demonstration: Up until now we have been putting pictures together which are alike in only one way. Pictures may also be alike in two ways at the same time.

For example, these pictures (13, 14, 15, 16) all belong together in two ways which are written on the back of this card (Concept Card).

Notice that they show both a large triangle and a black border which is not true of any of the others. (Have S inspect all remaining pictures. Emphasize notion of joint presence--both parts must appear together.)

Now these pictures (Exemplars) belong together because they are alike in two ways written on the back of this card (Concept Card). Can you tell me the two ways in which these are alike?

If S is incorrect, point out error and have him guess again. When he is correct: Fine, that is what is written on the back of the card. (Uncover).

Now, can you find another picture which belongs with these in the two ways written on the card?

Code no.	Concept	Exemplar nos.	Correct choice
0	large diamond + small square	4, 7, 8	3
I	small circle + white border	1, 2, 10	9
X	large black figure + triangle (black triangle)	12, 14, 16	10

(continued)

Appendix F (continued)

6. Attainment of Complex Concepts -- For all sets.

Examiner selects only one Exemplar.

(This time) This picture (Exemplar) belongs with some others in two ways that are written on the back of this card (Concept Card). You are to try to guess the answer on the card which tells the two ways in which the pictures go together.

Start by choosing a picture from the (center of the) board which you think might belong with this one (Exemplar). If the one you choose fits both parts of the answer on the card, I will place it on this side (S's right). If it doesn't happen to fit both parts combined, I'll put it here (S's left).

After I tell you where the picture goes, you will have a chance to try to guess the answer. You will have only one guess, but then you may keep on choosing other pictures to help you. Each time I tell you where a picture goes, you will get another guess.

Remember this rule: The answer on the card -- both parts together -- will always be true for all of the pictures on this side (S's right). The two parts combined will never fit any of the pictures that go here, even though one part might.

Don't forget--your object is to guess what is on the card. Sometimes a picture which goes on this side (left) can help you with the answer just as much as one that goes here (right).

Code no.	Concept	Exemplar no.	Positive instances
E	large diamond + white border	4	1-3 (1st row)
N	large triangle + small circle	10	9, 13, 14
D	small square + large black figure	16	4, 8, 12 (4th col.)
	Refresher--2nd Day		
3 r	large diamond	8	1-7
G	large triangle + white border	11	9, 10, 12 (3rd row)
T	large black figure + black border	14	6, 8, 16

Appendix G

1. List of all potential simple (1-8) and complex (A-X) concepts

Concept code	Sample Set	Neutral Set
1.	(small) circle	chair without arms
2.	(small) square	chair with arms
3.	(large) diamond	table without cloth
4.	(large) triangle	table with cloth
5.	large white figure	white vase
6.	large black figure	black vase
7.	white border	white rug
8.	black border	black rug
A.	(small) circle + large white fig.	chair without arms + wh. vase
B.	(small) circle + large black fig.	chair without arms + bl. vase
C.	(small) square + large white fig.	chair with arms + white vase
D.	(small) square + large black fig.	chair with arms + black vase
E.	(large) diamond + white border	tb. without cloth + white rug
F.	(large) diamond + black border	tb. without cloth + black rug
G.	(large) triangle + white border	tb. with cloth + white rug
H.	(large) triangle + black border	tb. with cloth + black rug
I.	(small) circle + white border	chair without arms + wh. rug
J.	(small circle + black border	chair without arms + bl. rug
K.	(small) square + white border	chair with arms + white rug
L.	(small) square + black border	chair with arms + black rug
M.	(large) diamond + (small) circle	tb. without cloth + ch. without arms
N.	(large) triangle + (small) circle	tb. with cloth + ch. without arms
O.	(large) diamond + (small) square	tb. without cloth + ch. with arms
P.	(large) triangle + (small) square	tb. with cloth + ch. with arms
Q.	large white fig. + white border	white vase + white rug
R.	large white fig. + black border	white vase + black rug
S.	large black fig. + white border	black vase + white rug
T.	large black fig. + black border	black vase + black rug
U.	large white fig. + diamond	white vase + table without cloth
V.	large black fig. + diamond	black vase + table without cloth
W.	large white fig. + triangle	white vase + table with cloth
X.	large black fig. + triangle	black vase + table with cloth

(continued)

Appendix G (continued)

1. Potential concepts (continued)

Concept code	Positive-Mother Set
1.	boy with hand behind back
2.	boy with hand at side
3.	mother with hand at side
4.	mother giving glass to boy
5.	(mother wearing) white apron
6.	(mother wearing) black apron
7.	white floor panel
8.	black floor panel
A.	boy with hand behind back + white apron
B.	boy with hand behind back + black apron
C.	boy with hand at side + white apron
D.	boy with hand at side + black apron
E.	mother with hand at side + white floor panel
F.	mother with hand at side + black floor panel
G.	mother giving glass + white floor panel
H.	mother giving glass + black floor panel
I.	boy with hand behind back + white floor panel
J.	boy with hand behind back + black floor panel
K.	boy with hand at side + white floor panel
L.	boy with hand at side + black floor panel
M	mother with hand at side + boy with hand behind back
N	mother giving glass + boy with hand behind back
O.	mother with hand at side + boy with hand at side
P.	mother giving glass + boy with hand at side
Q.	(M. wearing) white apron + white floor panel
R.	(M. wearing) white apron + black floor panel
S.	(M. wearing) black apron + white floor panel
T	(M.wearing) black apron + black floor panel
U.	white apron + mother with hand at side
V.	black apron + mother with hand at side
W.	white apron + mother giving glass
X.	black apron + mother giving glass

Note.--For other parent sets, appropriate substitutions can be derived from Table 3.

(continued)

Appendix G (continued)

2. Location of instances comprising each potential concept

EXAMINER

1st col.	2nd col.	3rd col.	4th col.	
1	2	3	4	1st row
5	6	7	8	2nd row
9	10	11	12	3rd row
13	14	15	16	4th row

SUBJECT

Concept code no.	Positive Instances for Simple Concepts ($\underline{N}$ = 8)
1.	1, 2, 5, 6, 9, 10, 13, 14 (first two columns down)
2.	3, 4, 7, 8, 11, 12, 15, 16 (last two columns down)
3.	1 thru 8 inclusive (first two rows across)
4.	9 thru 16 inclusive (last two rows across)
5.	1, 3, 5, 7, 9, 11, 13, 15 - all odd nos. (first and third cols. down)
6.	2, 4, 6, 8, 10, 12, 14, 16 - all even nos. (2nd and 4th cols. down)
7.	1 thru 4; 9 thru 12 (1st and 3rd row across)
8.	5 thru 8; 13 thru 16 (2nd and 4th row across)

(continued)

Appendix G (continued)

2. Location of instances (continued)

Concept code no.	Positive Instances for Complex Concepts (N = 4)
A (1 + 5)	1, 5, 9, 13 (first column down)
B (1 + 6)	2, 6, 10, 14 (2nd column down)
C (2 + 5)	3, 7, 11, 15 (3rd column down)
D (2 + 6)	4, 8, 12, 16 (4th column down)
E (3 + 7)	1 thru 4 (first row across)
F (3 + 8)	5 thru 8 (2nd row across)
G (4 + 7)	9 thru 12 (3rd row across)
H (4 + 8)	13 thru 16 (4th row across)
I (1 + 7)	1, 2, 9, 10 (first half of 1st + 3rd row across)
J (1 + 8)	5, 6, 13, 14 (first half of 2nd + 4th row across)
K (2 + 7)	3, 4, 11, 12 (last half of 1st + 3rd row across)
L (2 + 8)	7, 8, 15, 16 (last half of 2nd + 4th row across)
M (3 + 1)	1, 2, 5, 6 (upper left quadrant)
N (4 + 1)	9, 10, 13, 14 (lower left quadrant)
O (3 + 2)	3, 4, 7, 8 (upper right quadrant)
P (4 + 2)	11, 12, 15, 16 (lower right quadrant)
Q (5 + 7)	1, 3, 9, 11 (upper left picture from each quadrant)
R (5 + 8)	5, 7, 13, 15 (lower left picture from each quadrant)
S (6 + 7)	2, 4, 10, 12 (upper right picture from each quadrant)
T (6 + 8)	6, 8, 14, 16 (lower right picture from each quadrant)
U (5 + 3)	1, 3, 5, 7 (first half of 1st + 3rd col. down)
V (6 + 3)	2, 4, 6, 8 (first half of 2nd + 4th col. down)
W (5 + 4)	9, 11, 13, 15 (last half of 1st + 3rd col. down)
X (6 + 4)	10, 12, 14, 16 (last half of 2nd + 4th col. down)

(continued)

Appendix G (continued)

3. The concepts and respective Exemplars employed in the experiment

Neutral Set	
Concept code no.	Location of Exem.
6	12
3	5
C	3
H	13
I	9
O	7
S	4
W	11

Positive-Mother Set	
Concept code no.	Location of Exem.
6	12
3	5
B	10
G	9
L	8
P	16
C	1
U	7

Negative-Mother Set	
Concept code no.	Location of Exem.
6	2
4	15
C	7
F	8
I	10
M	1
R	13
X	14

Positive-Father Set	
Concept code no.	Location of Exem.
5	9
3	3
A	1
H	16
K	12
N	10
T	6
V	8

Negative-Father Set	
Concept code no.	Location of Exem.
5	3
4	14
D	16
E	1
J	5
O	7
S	12
W	11

(continued)

Appendix G (continued)

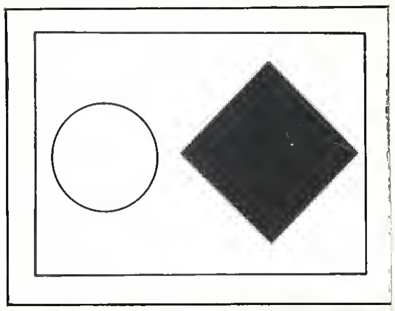
3. The concepts and respective Exemplars employed in experiment (cont.)

Counterbalancing of Concepts - Complex concepts could fall into 6 different types of location: columns (A, B, C, D); rows (E, F, G, H); quadrants (M, N, O, P); position within quadrants (Q, R, S, T); halves of 2 different columns (U, V, W, X); and halves of 2 different rows (I, J, K, L). Within a particular set, each of the 6 complex concepts offered for solution was drawn from a different type of location. Moreover, the 4 positions within each type of location was systematically varied from one parent set to another so that the total number of 24 complex concepts to be solved on all parent sets combined represented each of the possible positions (A through X).

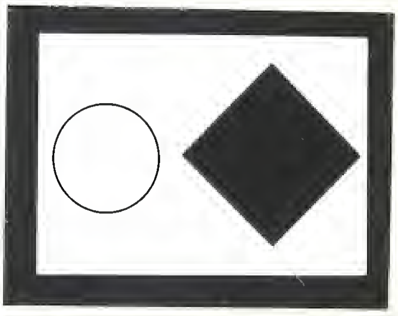
Counterbalancing of Exemplar Locations - Of the 6 Exemplars in each set, 3 were always chosen from the top half (Nos. 1-8) and 3 from the bottom half (9-16). Furthermore, of these 6 Exemplars, 2 always came from corners (1, 4, 13, 16), 2 from the center (6, 7, 10, 11), and 2 from border positions (2, 3, 5, 8, 9, 12, 14, 15).

Appendix H

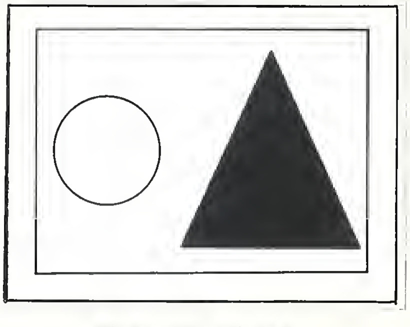
Attainment of Complex Concepts within Two Trials



Exemplar



Hypothetical
First Choice



Hypothetical
Second Choice

Appendix H

Attainment of Complex Concepts within Two Trials

Assume that illustrated Exemplar has been given at the outset. Six potentially correct complex concepts are immediately feasible:

circle and diamond
circle and white border
circle and large black figure
large black figure and diamond
large black fig. and white border
diamond and white border

Ideally the *S* chooses a picture which differs from the Exemplar in just one respect (see illustrated hypothetical first choice).

If Examiner places 1st selection on *positive side* of the test board, the white border cannot appear in the answer; 3 possibilities remain:

*circle and diamond
circle and large black figure
diamond and large black figure

If Examiner places 1st selection on *negative side* of the test board, the white border must appear in the answer; 3 possibilities remain:

*white border and circle
white border and diamond
white border and l. black fig.

First hypothesis is a guess from among 3 appropriate possibilities. *S* has 1 chance in 3 of attaining the concept on the very first trial. *Assume* 1st hypothesis offered was the starred one, and it didn't happen to be the one on the concept card. *S* is not scored "incorrect" since response was a feasible one. Meanwhile he has eliminated another possibility, and only 2 remain.

Ideally, the *S* chooses a picture which is illustrative of only 1 of the 2 remaining feasible combinations (see illustrated hypothetical second choice).

Assume 1st selection was a positive instance:

If 2nd choice is also positive, the answer must be "circle and large black figure"

but

If 2nd choice is negative, the answer must be "diamond and large black figure"

Assume 1st selection was a negative instance:

If 2nd choice is positive, the answer must be "white border and large black figure"

but

If 2nd choice is also negative, then the answer must be "white border and diamond"

Appendix I Number of Incorrect Hypotheses for Each S 1. Normal Control Ss

Subj. no.	Divided according to content					Total	Divided according to type			
	Neut	Pos-M	Neg-M	Pos-F	Neg-F		Negative	Positive	Repetitive	Idiosyncratic
N 1.	2	5	0	0	1	8	6	1	1	0
N 2.	0	1	2	4	2	9	7	0	2	0
N 3.	4	0	0	2	4	10	6	1	3	0
N 4.	1	3	0	1	2	7	6	1	0	0
N 5.	0	1	1	2	0	4	2	0	2	0
N 6.	3	2	10	8	4	27	16	1	2	8
N 7.	1	2	1	0	1	5	4	0	1	0
N 8.	1	3	2	0	1	7	7	0	0	0
N 9.	0	3	0	1	0	4	0	3	1	0
N 10.	0	0	1	1	1	3	1	1	1	0
N 11.	0	1	2	1	1	5	3	0	2	0
N 12.	2	2	1	1	0	6	4	1	1	0
N 13.	3	2	2	6	10	23	8	5	10	0
N 14.	1	1	0	1	3	6	3	1	2	0
N 15.	1	3	6	0	2	12	9	2	1	0
N 16.	1	1	2	1	1	6	6	0	0	0
Total	20	30	30	29	33	142	88	17	29	8

(continued)

Appendix I (continued) Number of Incorrect Hypotheses for Each S 2. GPM Schizophrenic Ss

Subj. no.	Divided according to content						Divided according to type			
	Neut	Pos-M	Neg-M	Pos-F	Neg-F	Total	Negative	Positive	Repetitive	Idiosyncratic
G 1.	1	2	2	0	1	6	2	2	2	0
G 2.	2	10	2	10	5	29	7	6	14	2
G 3.	3	10	2	7	5	27	7	3	4	13
G 4.	0	2	0	1	3	6	1	3	2	0
G 5.	4	7	4	8	0	23	7	2	13	1
G 6.	3	1	2	3	1	10	3	2	5	0
G 7.	2	0	2	5	1	10	5	1	4	0
G 8.	1	3	2	2	5	13	10	1	2	0
G 9.	0	0	1	0	0	1	1	0	0	0
G 10.	1	0	8	4	1	14	10	0	3	1
G 11.	2	0	5	3	1	11	7	1	2	1
G 12.	1	0	0	2	0	3	1	1	1	0
G 13.	2	5	11	7	6	31	17	0	11	3
G 14.	0	1	0	2	0	3	2	0	1	0
G 15.	1	3	2	1	5	12	8	0	2	2
G 16.	4	5	2	1	3	15	9	0	3	3
Total	27	49	45	56	37	214	97	22	69	26

(continued)

Appendix I (continued) Number of Incorrect Hypotheses for Each S 3. PPM Schizophrenic Ss

Subj. no.	Divided according to content					Total	Divided according to type			
	Neut	Pos-M	Neg-M	Pos-F	Neg-F		Negative	Positive	Repetitive	Idiosyncratic
P 1.	2	1	3	0	0	6	5	1	0	0
P 2.	1	0	0	3	0	4	3	1	0	0
P 3.	11	2	2	2	15	32	8	9	13	2
P 4.	4	3	2	0	1	10	9	0	1	0
P 5.	2	1	5	5	4	17	6	9	2	0
P 6.	6	7	12	6	8	39	26	0	11	2
P 7.	0	3	1	0	0	4	2	2	0	0
P 8.	3	2	5	2	4	16	4	1	9	2
P 9.	6	8	2	9	1	26	3	3	20	0
P 10.	2	6	1	2	5	16	6	1	7	2
P 11.	1	9	5	2	4	21	16	2	3	0
P 12.	1	5	8	5	0	19	7	0	12	0
P 13.	5	9	3	2	11	30	17	0	13	0
P 14.	2	1	1	1	1	6	3	1	2	0
P 15.	1	3	0	1	1	6	6	0	0	0
P 16.	0	14	3	2	3	22	11	7	3	1
Total	47	74	53	42	58	274	132	37	96	9

(continued)

Appendix I (continued) Number of Incorrect Hypotheses for Each S 4. D-PPM Schizophrenic Ss

Subj. no.	Divided according to content					Total	Divided according to type			
	Neut	Pos-M	Neg-M	Pos-F	Neg-F		Negative	Positive	Repetitive	Idiosyncratic
D 1.	3	1	0	0	2	6	5	1	0	0
D 2.	0	4	1	0	3	8	4	1	1	2
D 3.	3	0	4	2	3	12	5	2	5	0
D 4.	8	8	4	3	1	24	8	12	4	0
D 5.	3	6	0	7	11	27	8	4	13	2
D 6.	1	2	1	1	1	6	3	2	1	0
D 7.	1	1	3	2	8	15	5	2	8	0
D 8.	0	0	1	1	0	2	2	0	0	0
D 9.	3	1	1	2	4	11	4	6	1	0
D 10.	8	3	12	5	4	32	12	6	10	4
D 11.	2	1	4	7	9	23	14	1	7	1
D 12.	4	3	7	8	9	31	4	14	11	2
D 13.	11	4	0	10	8	33	15	2	16	0
D 14.	0	2	0	0	1	3	0	2	1	0
D 15.	1	5	0	0	7	13	6	0	6	1
D 16.	5	13	6	2	0	26	13	5	5	3
Total	53	54	44	50	71	272	108	60	89	15

Appendix J

Table 1

Contents x Sequences Divided into 12 Component Interactions (each with 1 *df*)

Sequence component	Orthogonal comparisons
X = a + d vs. b + c	In 1st session, P-M + N-F vs. N-M + P-F
Y = a + c vs. b + d	Initial set is positively toned vs. negatively toned
Z = a + b vs. c + d	Initial set is a mother fig. vs. a father fig.

Content component	Orthogonal comparisons
A	Neutral vs. all parent sets
B	Both Mother vs. both Father sets
C	Positively toned vs. negatively toned sets
D	P-M + N-F vs. N-M + P-F sets

Source of variation	Mean square	*F*	*P*
X x A	7.0508	--	--
X x B	.0977	--	--
X x C	4.7852	--	--
X x D	79.8789	13.95	<.0005
Y x A	5.9133	--	--
Y x B	.0352	--	--
Y x C	.4727	--	--
Y x D	4.2539	--	--
Z x A	3.7195	--	--
Z x B	4.2539	--	--
Z x C	.0039	--	--
Z x D	.0352	--	--
error (w)	5.7250		

Note.--n.s. at *P* = .20.

Appendix J (continued)

Table 2

Comparisons between Mean Numbers of Incorrect Hypotheses for Each Diagnostic Group on Each Content, on Sequences P-M$\leftrightarrow$N-F/N-M$\leftrightarrow$F-F

Group (*N* = 8 per group)	Means on each of the contents				
	Pos-M	Neg-M	Pos-F	Neg-F	Neut
Normal	2.00	1.50	1.88	3.13	1.63
GPM	4.75	2.63	3.63	3.50	1.63
PPM	4.13	1.75	1.38	4.00	3.25
D-PPM	4.63	1.88	2.13	3.13	3.88

Comparisons	Diff.	*P*
Between Groups[a]		
On the Pos-M Set:		
Normal vs. GPM	2.75	.05
Normal vs. PPM	2.13	.20
Normal vs. D-PPM	2.63	.10
GPM vs. PPM	--	n. s.
GPM vs. D-PPM	--	n. s.
PPM vs. D-PPM	--	n. s.
On the Pos-F Set:		
Normal vs. GPM	1.75	.20
Normal vs. PPM	--	n. s.
Normal vs. D-PPM	--	n. s.
GPM vs. PPM	2.25	.10
GPM vs. D-PPM	--	n. s.
PPM vs. D-PPM	--	n. s.
On the Neut Set:		
Normal vs. GPM	--	n. s.
Normal vs. PPM	--	n. s.
Normal vs. D-PPM	2.25	.10
GPM vs. PPM	--	n. s.
GPM vs. D-PPM	2.25	.10
PPM vs. D-PPM	--	n. s.

(continued)

Appendix J (continued)

Table 2 (continued)

Comparisons between Mean Numbers of Incorrect Hypotheses for Each Diagnostic Group on Each Content, on Sequences P-M↔N-F/N-M↔P-F

Comparisons	Diff.	*P*
Within Groups		
For the Normal group:		
Pos-M vs. Neg-M	--	n. s.
Pos-F vs. Neg-F	--	n. s.
For the CPM group:		
Pos-M vs. Neg-M	2.12	.20
Pos-F vs. Neg-F	--	n. s.
For the PPM group:		
Pos-M vs. Neg-M	2.38	.10
Pos-F vs. Neg-F	2.62	.10
For the D-PPM group:		
Pos-M vs. Neg-M	2.75	.05
Pos-F vs. Neg-F	--	n. s.

Note. -- *df* = 112; n. s. at *P* = .20.

[a] On Neg-M and Neg-F sets, differences between groups are all n. s.

Appendix J (continued)

Table 3

Comparisons between Mean Numbers of Incorrect Hypotheses on Combined-Mother and Combined-Father Sets for *Ss* Divided into Premorbid Score Tertiles

Group	*N*	Group means on combined parental sets	
		Mother	Father
Low score *Ss*	11	5.18	5.55
Intermediate	10	5.00	5.60
High score *Ss*	11	10.36	6.91

Comparisons	*t*	*p*[a]
Between Groups		
On Combined-Mother Sets:		
Low vs. Intermed. score *Ss*	--	n. s.
Low vs. High score *Ss*	4.211	.001
Intermed. vs. High score *Ss*	4.254	.001
On Combined-Father Sets:		
Low vs. Intermed. score *Ss*	--	n. s.
Low vs. High score *Ss*	--	n. s.
Intermed. vs. High score *Ss*	--	n. s.
Within Groups		
Combined-M vs. Combined-F Sets:		
Low score *Ss*	--	n. s.
Intermediate score *Ss*	--	n. s.
High score *Ss*	2.865	.01

Note. -- *df* = 29; n. s. at *P* = .20.

[a] Two-tailed test.

Appendix J (continued)

Table 4

Comparisons between Mean Numbers of Incorrect Hypotheses for Each Type of Error

($\sqrt{X + 1}$ Transformation)

Type	Mean
Negative	2.64
Positive	1.65
Repetitive	2.11
Idiosyncratic	1.28

Between-type comparisons	Diff.	*p*
Negative vs. Idiosyncratic	1.36	.001
Negative vs. Repetitive	.53	.001
Negative vs. Positive	.99	.001
Positive vs. Idiosyncratic	.37	.005
Positive vs. Repetitive	.46	.001
Repetitive vs. Idiosyncratic	.83	.001

Note.--*df* = 180.

Appendix J (continued)

Table 5

Analysis of Variance of Number of Non-informative Choices

Source	*df*	Mean square	*F*	*p*
Between *Ss*	63			
Groups (G)	3	15.0125	--	--
Sequences (S)	3	3.0875	--	--
G x S	9	12.3097	--	--
error (b)	48	19.5792		
Within *Ss*	256			
Contents (C)	4	.4578	--	--
C x G	12	1.9995	--	--
C x S	12	3.5276	1.51	<.20
C x G x S	36	3.2290	1.38	<.10
error (w)	192	2.3396		
Total	319			

Appendix J (continued)

Table 6

Analysis of Variance of Number of Redundant Choices

Source	*df*	Mean square	*F*	*P*
Between *S*s	63			
Groups (G)	3	7.6365	--	--
Sequences (S)	3	1.2031	--	--
G x S	9	6.4503	--	--
error (b)	48	7.0885		
Within *S*s	256			
Contents (C)	4	12.2422	2.89	<.025
C x G	12	2.2380	--	--
C x S	12	3.7422	--	--
C x G x S	36	4.8436	--	--
error (w)	192	4.2318		
Total	319			

Appendix J (continued)

Table 7

Comparisons between Mean Numbers of Redundant Choices for Each Content

Content	Mean
Neut	2.20
Pos-M	2.97
Neg-M	2.80
Pos-F	2.41
Neg-F	3.30

Between-content comparisons	Diff.	*P*
Neut vs. Neg-F	1.10	.005
Neut vs. Pos-F	--	--
Neut vs. Neg-M	.60	.10
Neut vs. Pos-M	.77	.05
Pos-M vs. Neg-F	--	--
Pos-M vs. Pos-F	.56	.20
Pos-M vs. Neg-M	--	--
Neg-M vs. Neg-F	.50	.20
Neg-M vs. Pos-F	--	--
Pos-F vs. Neg-F	.89	.025

Note.--*N* = 64 treatments per content (16 *S*s x 4 groups); *df* = 192; n.s. at *P* = .20.

Appendix J (continued)

Table 8

Frequency Distribution of Ss in Each Diagnostic Group Showing Presence or Absence of Two Types of Verbal Responses

Group	Type A,[a] only	Type B,[b] alone or in addition to Type A	Neither Type
Normal	9	4	3
CPM	8	2	6
PPM	6	5	5
D-PPM	7	4	5
All groups combined	30	15	19

Note.-- $X^2 = 3.472$; n. s. at $P = .20$; df = 6.

[a] Non-interpersonal description.

[b] Non-familial description.

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